IN THIS ISSUE: A New Year in the Electrical Industry

JOURNAL OF ELECTRICITY

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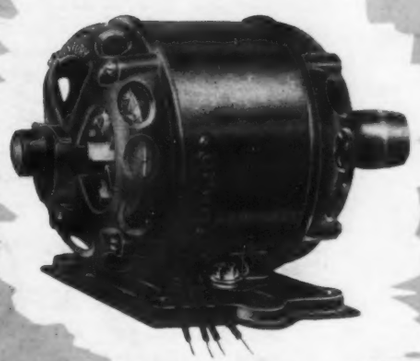

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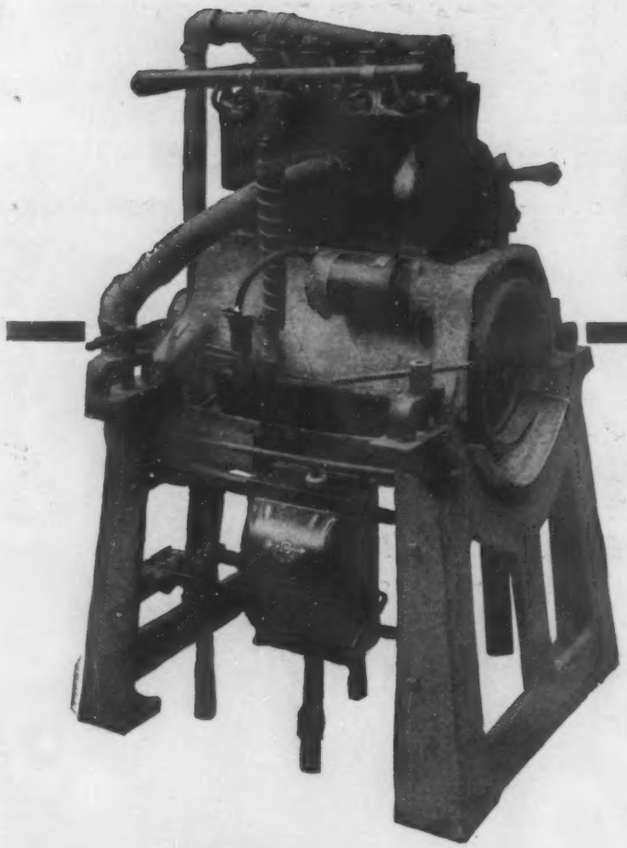

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JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor

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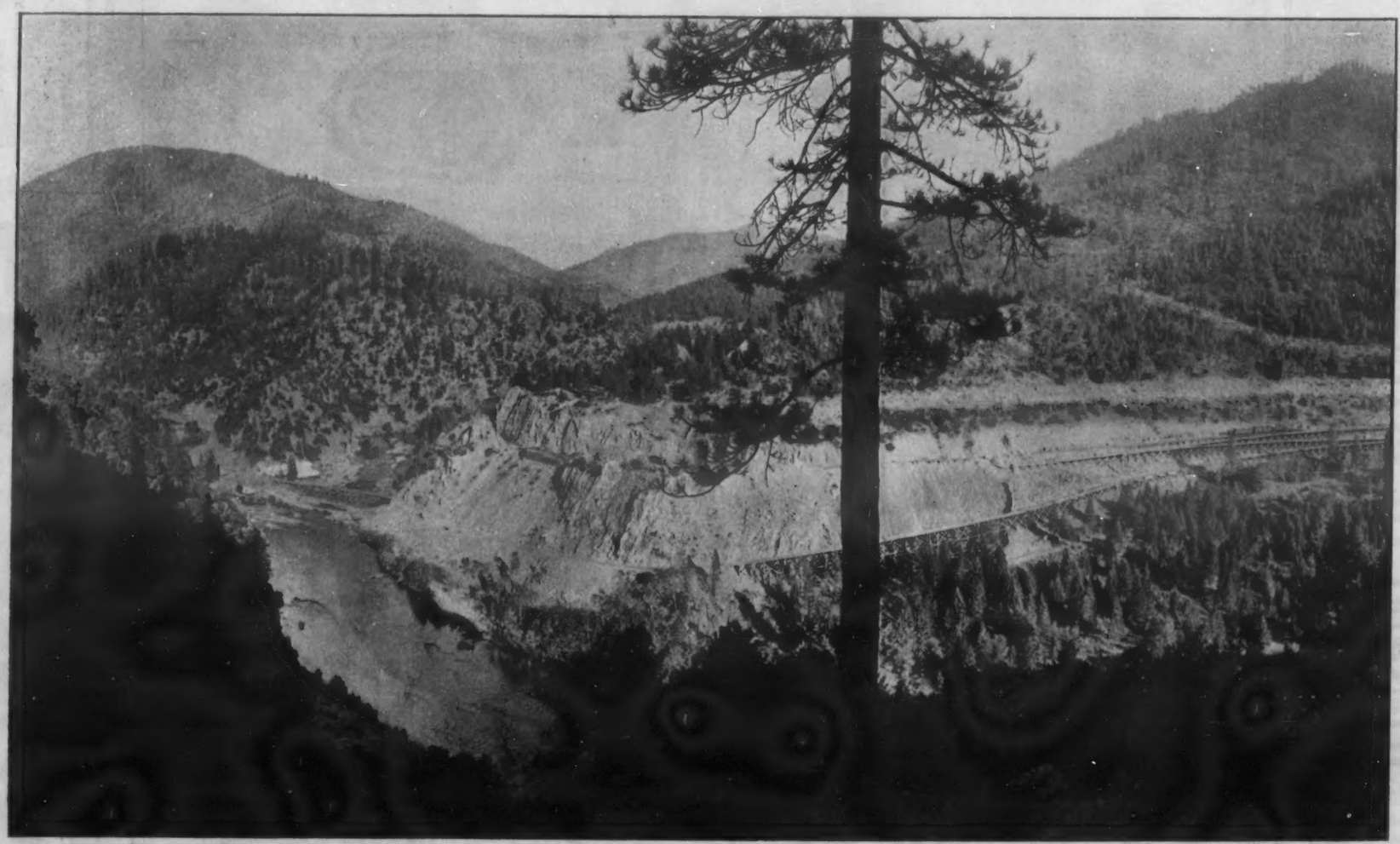

THE NEW YEAR sees numerous construction projects under way in the West. The re-establishment of normal activities after the war period brought an insistent demand for power from the cities and agricultural districts alike, which has been met by the extensive plans for hydroelectric development now being carried out. Among the most important of these construction enterprises is the Caribou Project of the Great Western Power Company on the Feather River, California, where an additional 40,000 kw. will be added to the power already developed at the Las Plumas plant. The picture shows the switchback which connects the broad-gage road constructed by the power company with the Western Pacific Railroad, which here turns off to the East Fork of the Feather River.

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JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

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The Dawn of a Decade

TODAY, January 1st, 1920, the world waits expectantly upon the threshold of a new year, a new decade. It is a momentous epoch that we enter. Shaken to its very foundation by the strainings of terrible years of warfare, the civilization that has been humankind's heritage still survives, but must be upbuilded and strengthened anew. For all its transgressions, the world has not come to an end. Yet there is an end to much that we knew ten years ago; the world is a far different place to live in, strange new conditions surround us everywhere, insistent problems clamor for solution. Captains of industry are marshalling their forces on farm and in factory, proclaiming that this shall not be a decade of destruction and madness, but a period of production, ennobling labor.

We of the electrical industry must help preserve the fine sanity which is to safeguard the integrity of American industrial life within the next ten years. Material prosperity shall be ours by right of enterprise; but more than that, let us seek to aid the maintenance of health in the national mind.

The world spins dizzily through space; yet with this day's dawning has come the time for clear vision and steady hand. At the outset of these years which it is our hope posterity may hail as "the splendid thriving 'twenties," an appeal goes out from the council of nations, "The world must go to work!" We in the West are already at work.

What Will the Census Show?

That the Census of 1920 will reveal a remarkable growth for all Western states in population, wealth and material resources, is the confident expectation of those in touch with the development of this great section of the country within the past ten years. The compilation of the exact figures will be awaited eagerly, and, no doubt, despite all our estimates and guesses beforehand, they will contain many genuine surprises. It is essential that our true strength be shown in every field, and the efforts of all good citizens should be directed toward making this great decennial enumeration full and accurate.

Estimates as to the standing of the West in population and production have recently been made. The eleven states west of the Rockies hold 7% of this country's population—and it is interesting to note that of the electric power used in the United States, 20% is used in the West. Together with Alaska, the West produces 85% of our copper; 91% of our gold; 96% of our silver; 35% of our petroleum. The value of its fisheries is 45% of those of the whole United States. The worth of its farm property is 11% of the nation's; it produces 17% of the wheat; 25% of the orchard fruits; 47% of the nut crop. Of all the cattle in this country at the last census, 15% of them were in the West.

One notable field in which a gain will unquestionably be shown is manufacture. According to last reports the West produced 7% of this country's manufactures—exactly corresponding with its percentage of population. However, the development of hydroelectric energy and fuel oil, as well as new coal fields in Colorado and the Northwest, have given great impetus to industrial enterprise. The war, too, caused the creation of several large industries, notably shipbuilding.

Certainly in the manufacture of electrical machinery, apparatus and supplies, the West will show a gain. Hitherto California has been the only state in this territory that has had any considerable share in the industry. In 1909, there were 435 wage-earners engaged in making electrical machinery, apparatus and supplies in California; in 1914 there were 780. Today, there are possibly three times that number. One mazda lamp factory in Oakland employs almost as many workers now as all electrical factories in the state did five years ago. Colorado had about 100 persons engaged in this industry at the last census of manufactures, and that state also is expected to show a material gain.

There is much that the electrical industry in the West can do to help the enumerators in their task. Let us cooperate fully with the Bureau of Census, that the true strength of the states west of the Rockies may be truly represented before the world.

Confidence Well-Grounded

Construction has been begun on new hydroelectric power plants in California which will entail an expenditure of more than $25,000,000, according to the recently issued annual report of the California State Railroad Commission. These plants will all be in operation in 1920 or 1921, and they will add enormously to the developed electric power in California. Yet the Commission, in commenting upon this, declares: "While an expenditure of $25,000,000 may seem large, we are satisfied that it will not result in an over-production of hydroelectric energy." It is truly assuring to have such an authoritative statement from this commission, which is in an excellent position to judge what the industrial demands of the State are likely to be during the next few years.

The outstanding fact in this situation, however, is the confidence displayed by the power companies in entering upon a great program of expansion of hydroelectric systems, during a year which has seen scant rainfall and which follows two unusually dry seasons. That the power companies are going forward with their plans shows that they deem water resources not only adequate but ample; and, no doubt, the "pooling-of-power" plan under a centralized power administration, as carried out during the war and still retained, reassures them that they will be enabled to maintain a constant power supply at all times. There is confidence, too, on the part of investors, who make the proper financing of this development possible. They place dependence upon the proved integrity of the power company management and upon the attitude of a State regulatory commission which announces "a broad policy based on regard for the rights of the public, and fairness for the investor and the utility."

Surely, the hydroelectric development in the West is being undertaken in a healthy spirit of optimism—an optimism based upon facts, and a mutual confidence which is indeed gratifying to all who wish well to the electrical industry.

Beginning a New Set of Books

The new year means in most businesses a new set of books. With the taking of stock and the balance sheet which indicates totals for the year, a clean sweep is made of uncertainties and the new books are opened with a fresh slate. The opportunity which this offers for the adoption of the standard accounting system worked out by the National Association of Electrical Contractors and Dealers should not be overlooked. The system is the simplest and at the same time the most comprehensive which could be devised. It makes it possible for the contractor-dealer to know at any time just where he stands, either in his store sales and profits or in his contracting jobs.

The chief difficulty which has stood in the way of its universal adoption has been the necessity of closing the present books before a new set could be opened and the consequent labor involved. The new year brings this task as part of the regular run of business. Why not send for one of the Standard Accounting Systems at once, in order to start the new year on a firmer business basis? The Journal of Electricity will be glad to receive orders for this set and to pass them on to the National Association—or orders may be placed with the secretary of your local association—or through such organizations as the California Electrical Cooperative Campaign. A special price at cost is made to members of the association, but the system may be purchased by anyone who desires to better his accounting methods.

Dangers of the Word "Profiteer"

The present age is one greatly addicted to phrases. According as a label is affixed to a movement or an individual, so is he judged, irrespective of the merits of the individual case. The injustices involved in the careless use of the term "trust," for instance, are familiar to the past decade, while the epithet "bolshevik" is perhaps the best example of a blanket condemnation at the present time.

The word "profiteer" is one of the phrases of the moment, used promiscuously, sometimes with great injustice. It is a term which injures all business, through its implication of prevalent dishonesty. The privately owned utility has already suffered greatly through the popular tendency to rail against corporations and "big business." It is to the interest of every electrical man to discourage the careless use of epithets and the formation of another unfounded prejudice against business as a whole, which will later have to be wiped out through a campaign of education.

Industrial Lighting

Widespread interest in modern industrial lighting is today being manifested throughout the manufacturing districts of the West, and the several elements of the electrical industry find themselves now constantly in receipt of inquiries on this important subject from plant owners, superintendents and others connected with factory management. Of particular importance, therefore, is the issuance of new General Lighting Safety Orders by the Industrial Accident Commission of the State of California. A comprehensive review of this up-to-date code is contained in the present issue of the Journal of Electricity.

The result of the new industrial lighting laws is certain to be a quite general readjustment of illumination arrangements in factories. There will undoubtedly be numerous requests by industrial interests for advice as to lighting changes. In this regard, a careful survey recently made of lighting conditions in industrial plants of 57 towns in Eastern states (an investigation conducted for a large lamp concern) indicates the sources of information that the manufacturers are likely to seek. Of those consulted, 24.7% declared that they would go to the electrical retailer for advice as to lighting changes; 20.7% to the electrical jobber; 13.2% to the consulting architect or engineer; 9.2% to the central station; 7.1% to their own electrician; 6.1% to the lamp manufacturer; 5.9% to their own architect or

engineer; 1.6% to their own superintendent; 0.5% to other manufacturers' engineers. Those who defiantly said they would go "nowhere" for such advice constituted 1.9%; and 9.1% would go "elsewhere" or were doubtful.

It is a significant fact that, eliminating those who were doubtful as to whom they would consult, 72 per cent stated that they would go for advice on plant-lighting to the electrical distributor, or to someone in their own organization. In view of this interesting condition, it is apparent that electrical retailers, contractors, and wholesalers are expected by manufacturers to be qualified as "expert advisors" on industrial lighting. To their notice especially, therefore, is referred the new lighting code of California, that they may become thoroughly familiar with its provisions.

The Ready-to-Serve Charge

The principle of the ready-to-serve charge from time to time is challenged by consumers or communities who object to the payment of a tax for a service whose nature appears to them obscure. At the present time, for instance, the communities of central California are preparing to make a legal battle against the stand taken by the California Railroad Commission in favor of a ready-to-serve charge for water service. A large part of the criticism is due to the fact that the principle may be applied to electricity and other public utilities as well.

There has been a great deal of loose thinking on the subject, which in many respects has the elements of unpopularity involved in any form of direct taxation. Very little attention has been given the increase in value to property owners brought about by the mere existence of water mains, gas mains, and electric distribution systems in the streets. Strictly speaking, every property owner should stand some of the expense of up-keep of the distributing systems of these various utilities. This should not involve the entire cost of service, of course, where those actually making use of the water or electricity derive a greater benefit than those not so served, but should be a return for the service of the utility in bettering the standing and commercial values of the community as a whole. The ready-to-serve charge is a recognition of the fact that this universal benefit should not be paid for exclusively by those who consume the product. In strict justice, the payment should be made by all property owners, irrespective of actual connections, in the form possibly of a remission of taxes to the utility. The ready-to-serve charge is an attempt to collect this tax in a way which seems less painless to the public, who would always rather pay more for a product than pay a direct tax, so labeled. The principle is a sound one and the progressive stand taken by the California Commission should be upheld.

Possibilities of the Bonus System

From the use of solicitors by one or two of the largest electrical retail stores of the West, the practice has grown until there are over 120 solicitors in use in California alone and a great scarcity of available material is reported. There is no question but that the solicitor has proved himself a success. His commission is a high one, but it is recognized that the incentive must be adequate in order to attract the right type of man and to secure his full interest—and the return in volume of sales compensates the dealer for any profit he foregoes.

The bonus system for sales made over the counter is the application of this same principle to the interior salesman. The importance of an intelligently interested salesman in the shop can hardly be over-estimated. According to the service rendered through the salesman does the customer judge the intention of the proprietor. Actual test shows the value of the bonus system in bettering this service. A recent report from one of the progressive stores of southern California where the character of the employes was already above the ordinary, indicates that after the adoption of a bonus system, sales were greatly increased, even to the point of doubling in some instances. A simple form of rewards-for-service has been suggested by the California Electrical Cooperative Campaign for immediate adoption. There are many problems involved in the working out of a system which will actually best serve the individual business in practice, but the difficulties and advantages will show themselves in use, and the important matter is to adopt the system in some form and reap its immediate advantages.

Personal Rating of Contractor-Dealer

There is much being said as to how the personal rating of the contractor-dealer may be best ascertained. It is evident that the rating of personality of the man located in the big city or in the community wherein changes are alive and active should be on a different basis than for the man located in a smaller town or even in a larger city when the city as a whole is dead.

At best all ratings are more matters of comparison with similar standards. As a consequence the attention that is now being given to ratings of contractor-dealer stores in many communities of the West should be made pliable in comparison so that the type of community and business service prevailing in the locality in which the individual is situated might well come in for consideration.

IN THE NEXT ISSUE

Electricity in Los Angeles Terminal Warehouse

Inventories and their Income Tax Procedure

BY NORMAN LOYALL McLAREN

(In this article is presented an up-to-the-minute statement on the requirements of a proper stock-taking, particularly timely for the electrical merchandiser at the first of the year. Recent important rulings of the Bureau of Internal Revenue, U. S. Treasury Department, are herein discussed. The author is a member of the firm of McLaren, Goode & Company, certified public accountants, San Francisco.*—The Editor.)

Under date of October 10, 1919, the Bureau of Internal Revenue of the U. S. Treasury Department announced that a special drive to locate merchants and manufacturers who had followed erroneous methods in taking their inventories for the taxable years 1917 and 1918 was about to be made. In cases of voluntary disclosures, before investigation of failure to make proper return and payment, the policy of the Bureau, it was stated, would be to forego penalties, except where there was an intentional evasion of the tax. On the other hand, it was indicated that where discovery was made by Government officers, heavy penalties would apply. This announcement indicates the fairness of the Department's attitude toward taxpayers who have unintentionally failed to follow certain provisions of the Revenue Acts of 1917 and 1918.

Methods of Stock-Taking

Under the Department's interpretation of both acts, inventories may be valued only at (a) cost or (b) cost or market value, whichever is lower. By far the greater portion of correctly prepared income tax returns for both years were made on basis (b), and in practically every line of business it is standard accounting practice to take inventories at "cost or market, whichever is lower."

Some of the erroneous methods of stock-taking referred to above are of the following classes:

1. Inventories taken on average cost where the articles making up the inventories could be "ear-marked" and valued at actual costs.
2. Deduction of flat percentages to provide for possible losses upon sale.
3. Inventories taken on fixed averages based upon prior year costs.
4. Inventories omitting goods in transit.
5. Inventories omitting goods consigned by the taxpayer.
6. Inventories priced below both cost and market and omitting some portion of the goods on hand or in transit whose title was vested in the taxpayer.

In the event that any of these incorrect methods have been followed amended returns should be prepared at the earliest possible date adjusting inventories to "cost or market, whichever is lower" rather than "cost" in accordance with the sound accounting principle that all losses should be provided for but that profits should never be anticipated.

Change from Cash to Accrual Basis

Some merchants have followed the practice of making all income tax returns including the 1918 return on the basis of cash receipts and disbursements. This procedure is disallowed by the Department which has ruled in Article 1581 of Regulations 45 as follows:

> "In order to reflect the net income correctly, inventories at the beginning and ending of the year are necessary in every case in which the production, purchase or sale of merchandise is an income-producing factor."

The application of this rule will make it very difficult for some merchants to prepare correct amended returns where inventories have never been taken. It will be possible, however, to arrive at approximately the correct amount of "gross profit on sales" by the following method:

1. Add to the total cash sales during the entire life of the business the accounts receivable at December 31, 1919, to determine the total sales for all years.
2. Add to the total cash purchases the aggregate of accounts payable at December 31, 1919, to arrive at total purchases.
3. Add to total purchases the stock in trade at the time the business was started and deduct the inventories at December 31, 1918 (prices at cost or market, whichever is lower), to determine the "cost of goods sold" for the life of the business.
4. Determine the percentage of gross profit on sales to total sales.
5. Apply this percentage to the corrected sales for each year to determine the "gross profit on sales" each year. The corrected sales may be obtained by pro-rating the accounts receivable over the years affected on any equitable basis, taking into consideration the growth or decline of the business and adding the pro-rated amounts to cash sales for each year.

The above computation appears at first glance to be more complicated than it is in reality, and if only "receipt and disbursement" returns have been made for past years it is essential to make the adjustments indicated when changing to an accrual basis; otherwise one year will reflect corrections which should be spread over several years.

As soon as the necessary adjustments are made amended returns should be prepared for the years affected. These may be filed at once or with the 1919 return at the office of the District Collector of Internal Revenue.

It may be stated parenthetically that where adjustments of this type are necessary the opportunity should be taken to review previous returns for other errors. Perhaps depreciation of fixed assets has not been properly calculated. Perhaps the owners of the business have not credited themselves with salaries to which they were fairly entitled. Perhaps interest was not calculated on temporary advances by the owners. Perhaps the item "bad debts" shown as a business expense was estimated, but not actually written off. Perhaps permanent improvements which should have been capitalized were charged to operations. These are a few of the items that may have to be readjusted.

Adjustment of Inventories

Returning to the subject of this paper let us consider the adjustment of returns where inventories have been taken at the close of each fiscal period, but on an incorrect basis. If all the original inventory sheets have been preserved the recalcula-

*The writer acknowledges indebtedness to "Montgomery's 1919 Income Tax Procedure" and "The Prentice-Hall Tax Service" for many suggestions embraced herein.

tion will be comparatively simple. Cost and market at the several closing dates may be obtained very readily from invoices and, where necessary, by correspondence with the concerns from whom the goods were purchased. Care must be taken to include goods in transit and on consignment. Inward freight should be added to the cost or market of the goods on hand and outward freights to the consigned goods, but where freight is estimated it is important not to include freight on goods in transit. Goods consigned to the taxpayer or which have been sold and are being held for customers should never be taken into the closing inventory.

The importance of proper recording and safekeeping of the original inventory cannot be overemphasized. Aside from the Department's instructions to all taxpayers to preserve these sheets as part of their accounting records, their preservation may mean the saving of a considerable sum upon adjustment of a possible fire loss. Inventories should be legibly recorded on specially prepared "Inventory Forms" which can be obtained from any stationer. Count of quantities, footings and extensions should be verified by independent check. As soon as the summaries are transferred to the general books the original sheets should be securely bound and filed in a fire-proof receptacle.

Probably the only questions that will arise in pricing the inventories at "cost or market, whichever is lower" will be the treatment of cash discounts on purchases, and the treatment of purchases at different prices. With regard to cash discounts it is immaterial as to whether or not these are considered to be applied to reducing the cost of purchases or treated as miscellaneous income provided the taxpayer treats this item consistently from year to year. However, most accounting authorities favor the former procedure.

Purchases at Different Prices

With reference to purchases at different prices, where the goods on hand at the close of the period cannot be "ear-marked," inventories should be taken at the most recent purchase price to the extent of the last purchases. When quantities on hand at the close of the period exceed the last purchase, the balance should be applied to the next preceding purchase and so on. The above remarks apply only where cost is no greater than market at the closing date. In article 1584 of regulations 45, the Department has ruled with regard to inventories at market as follows:

> "Market means the current bid price prevailing at the date of the inventory for the particular merchandise; and is applicable to goods purchased and on hand and to basic materials in goods in process of manufacture and in finished goods on hand, exclusive, however, of goods on hand or in process of manufacture for delivery upon firm sales contracts at fixed prices entered into before the date of the inventory. Where no open market quotations are available the taxpayer must use such evidence of a fair market price at the date or dates nearest the inventory as may be available to him, such as specific transactions in reasonable volume entered into in good faith or compensation paid for cancellation of contracts for purchase commitments. The burden of proof will rest upon the taxpayer in each case to satisfy the Commissioner of the correctness of the prices adopted."

Recognizing that in the latter part of 1918, by reason among other things of governmental control not having been relinquished, conditions were abnormal, the Revenue Act of 1918 provided in Section 214 for losses arising from over-valuation of inventories. However, contrary to the opinion prevalent at the time the Act was drawn, prices of most commodities advanced rather than declined, and the majority of taxpayers will not have occasion to apply this relief provision.

Installment Sales

Where goods are sold on the installment plan the Department has ruled as follows:

> "In the sale of personal property on the installment plan the income to be returned by the vendor will be that proportion of each installment payment which the gross profit to be realized when the property is paid for bears to the gross contract price." Where inventories are used to arrive at gross profit on sales, the correct amount to be returned as income in a given period is as follows:
>
> 1. Deduct the amount of deferred installments from total sales. This calculation will give corrected sales.
> 2. In preparing the tax return enter as "sales" the corrected sales figure and as "cost of goods sold" the same percentage of the book cost of goods sold as corrected sales bears to book sales.
> 3. Determine the percentage of gross profit to book sales and apply this percentage to corrected sales. This calculation will give corrected gross profit on sales.

A practical example of these adjustments is as follows:

		Books	Corrected
Book Sales		$500,000.00	$500,000.00
Less Deferred Installments			100,000.00
Corrected Sales			$400,000.00
Beginning Inventory	$ 40,000.00		
Purchases	410,000.00		
	450,000.00		
Less Closing Inventory	50,000.00		
Cost of Goods sold		400,000.00	
Gross Book Profit on Sales		$100,000.00	
Percentage of $100,000 (Gross Profit) to $500,000 Gross Sales)—20%			
Corrected cost of goods sold (80% of $400,000)			320,000.00
Corrected Gross Profit on Sales (80% of $100,000)			$ 80,000.00

Summary

1. All returns of merchants and traders should be made on an accrual basis.

2. Inventories should be priced at cost or market, whichever is lower.

3. Amended returns should be prepared correcting errors of previous years, with particular reference to inventories.

4. Cash discounts should be deducted from the purchase price in arriving at the cost of goods.

5. Profit credited in the books on installment sales should be adjusted to include only profit on installments actually due at closing date.

6. If goods included in the inventory at December 31, 1918, have been sold during the year at a lower price than inventory figures, an amended return for 1918 should be prepared claiming an abatement or refund on this account.

A district office display room of the Southern California Edison Company. A display room is one of a power company's best salesmen if well designed and organized. There should be plenty of light, an effect of spaciousness, and no suggestion of overcrowding in the display arrangement. Notice the jeweler's cases for exhibiting appliances; also the use of pictures and flowers.

The Display Room

BY S. M. KENNEDY

(A display room is an investment upon which a power company can afford to spend considerable time and thought. The general agent of the Southern California Edison Company here reviews some of the factors which make the display room a successful medium for educating the public electrically and increasing the sale of appliances. This is the fifth article of the series by the same author on power company practice.—The Editor.)

There are three branches of the electrical industry directly interested in the sale and distribution of all kinds and varieties of electrical appliances, but each class is interested from a different angle. The first class is the manufacturer who wants a market for his products, his particular desire being to induce those in the second and third classes to act as his distributors. The second class comprises the jobber and dealer, and they are both merchants looking for a merchandising profit. Their interest in a sale usually ends with the delivery of the goods. The third class is the central station company and its main object is not a merchandising profit, but a greater and more diversified connected load. The interest of those in the third class only begins with the delivery of the goods; and their benefit is continuous, like the brook that "goes on forever." Because the various branches of the industry are interested in this important matter, there should be a broad cooperation existing between all concerned, so that the demand may be created and the field more quickly and more effectually covered.

The Display Room as Salesman

From the standpoint of the electric company, there are three principal ways of reaching the public, in order to create and stimulate the demand for electric energy and increase the output of the central station plant. The first is personal solicitation, the second advertising, and the third the well-appointed display room. Now, as a matter of fact, advertising seldom carries the persuasion which closes a contract; it takes the personal solicitation, or the kind of conviction that is produced by actual observation, to obtain the signature of a prospect to an electric service agreement. Consequently, experience has shown that the display room is not only a valuable concomitant in connection with advertising, and a useful assistant to the salesman, but is in itself of incalculable benefit to an electrical distributing company. It is a means of directing the attention of the public to the actual operation of various electrical devices, and thereby aids in attaining the most desired objective of the company, that is, the building up of a profitable load for every hour of the day. There cannot be too many properly operated display rooms in a community. The manufacturer, the dealer and the central station may each have one on the same street without hurting each other, and, as a consequence, many more appliances will be sold. If the manufacturer establishes an exhibit in a busy center—he often creates a demand which is cashed in by the dealer. If the central station maintains

a display room it helps itself—stimulates business for the dealer and increases sales in various directions which develop business for the manufacturer. And as for the dealer, he becomes a public benefactor. In addition to the lasting benefit which he confers upon his customer by inducing him to acquire

Display room of the H. L. Miller Company, Pasadena, Cal. A display room should be as commodious as possible to accommodate the free coming and going of visitors.

and use a tried and tested electrical appliance, he obtains a profit for himself—keeps the wheels of the manufacturer in more continuous motion, and adds to the central station's constant load and income. This is the cooperation which really cooperates, and leads to a closer and more beneficial connection among the various branches of the electrical industry.

In order properly to analyze the advantages and uses of the display room, the subject may be studied from three angles: (a) appointments and methods; (b) value of demonstrations; (c) value of food exhibits in connection with display rooms. A brief consideration of each angle may be of interest.

Appointments and Methods

In considering the fitting up of a display room, the first questions to settle are those pertaining to situation and size. The room should be centrally located in the business portion of the community, past which many people are continually coming and going. There is little use locating a display room on an out-of-the-way street—to a large extent this would be like wasting powder and shot. The room should be commodious and of sufficient area to permit of the proper display of all apparatus and appliances which are to be exhibited, and at the same time allow a free access for visitors to move about without crowding. An over-crowded display room defeats its purpose. If the space is not ample it is better to display fewer appliances and show them to advantage. The size of the room has little relation to the size of the community in which it is located. There should be as large an exhibit in a town of 5,000 people as in a city with a population of 50,000—because the number and variety of appliances which it is desirable to put before the public is the same in each case.

The display room should be bright, clean and inviting at all times. Particular attention should be given to the color scheme and illumination. The veriest novice in the business can realize that unless the room is attractive in itself, the advantages to be obtained may be minimized, if not altogether lost. The display room should contain abundant stock and nothing but electrical goods. The samples on exhibition should be scrupulously clean. If an electric fan is being shown with dust on its base, and fly marks on the blades, the customer will not be as much impressed as if there were a clean base and shining blades. If a customer is looking at an elec-

Display room of the F. E. Newbery Electric Company, Los Angeles, Cal. If all appliances have the price clearly marked, they will often sell themselves—a great advantage during a busy period.

tric toaster which has previously been used for demonstrating, and the bottom contains stale crumbs and dust, it will not make the same impression as if the appliance were in a spick and span condition.

In the display room, the many appliances for various kinds of uses should be segregated into

Display room of Winder & Jones, Covina, California. As far as possible the different appliances should be segregated into groups so that several designs of the one appliance may be conveniently inspected.

groups, so that all pertaining to any particular use may be within easy reach. Lamp exhibits should be in one class and so arranged that the illuminating effect of any one lamp could be best demonstrated when the current is turned on. This method also permits of easy comparison as to the relative effects

of different lamps. All appliances which are used in the office or store should be together. All appliances for household use should be assembled by themselves. Appliances for the workshop and factory properly belong to another class and should be located where they may be shown to advantage and not weaken the attractiveness of some other devices which often sell on their appearance. As far as possible, specimens of each type of appliance should be connected up, so that the current may be readily turned on, and their operation demonstrated. Wherever space is available, such appliances as are not complete in themselves should be connected to apparatus and contrivances which are adapted to the use of electric energy for their operation. This applies to sewing machines, dish washers, coffee grinders, lathes and many of the other small devices which may be successfully operated by the use of direct connected or belt driven motors.

The usual display room of the dealer is located in his business establishment. It goes without saying that the exhibits should be in the front part of the room, and the staple goods in the rear. This means that all customers entering the store for any purpose must necessarily pass by and see the articles displayed. Stock and supplies maintained in the rear of the display room should be kept on clean shelves and tables, as neat and tidy as the room itself. One part cannot be untidy and careless-looking without affecting the appearance of the whole. Jewelers' show cases display the better goods to great advantage, and the cases are more useful still, if suitably illuminated.

Supplementary Features

Every lighting customer buys lamps and consequently lamps should be featured. Lamps of only the proper voltage for local circuits should be stocked —but lamps of every useful size and variety in the required voltage should be kept on hand and exhibited. Too much care cannot be given to all the details in connection with planning and arranging a proper show room. The money spent in suitably decorating and adequately wiring, and the current used in demonstrating are of little moment in comparison with the assured results accruing from a properly equipped exhibit. Tasteful literature is a factor which should not be overlooked. Visitors who have seen and become interested in appliances exhibitted in a display room are willing to take home with them something which will refresh their memory, and enable them to talk the matter over with others who may be interested.

Neither the contractor-dealer nor the central station company should look upon a modern display room as only an opportunity to spend money for ornamental purposes. If properly conducted, it will not only pay its own way, but in addition will yield a handsome profit. Many contractor-dealers who formerly neglected their opportunities for merchandising, now find it is the most remunerative department of their business. Careful accounting methods are necessary for both contractor-dealers and central station companies, so that they may realize just what profit the display or salesroom is producing.

All appliances on exhibition should be ticketed and priced in plain figures. This saves time and, during busy hours or when help is scarce, the appliances will often sell themselves. If an article is not priced, and no salesman near, a consumer will frequently lose interest. There can be no harm done in putting the price on an article in plain figures—and on the other hand a sale may be lost because the price is not clearly stated. Employes exhibiting or selling appliances should know the consumption of each device, the rate per kilowatt-hour for service supplied by the local central station company and also the cost per hour for operating any appliance shown. If such information is not available, the customer will often hesitate or postpone a purchase until the cost of operation is known and fully understood.

Demonstrations by a first-class cook are among the most convincing of all selling arguments for electrical cooking apparatus, and a power company will do well to include special demonstration days in its plans.

It is needless to say that good show windows should accompany electric display rooms. The best possible equipment is none too good for the show windows. This applies to the painting, color scheme, decoration, sign lettering and illumination. The more class to the window, the more attention it will draw and the more goods will be sold. Above all, taste and care should be used in displaying the appliances in the window. Better change the window often and display only one type of appliance at a time, than endeavor to exhibit a number of different kinds of appliances at once and over-crowd the window. There is great scope for originality and taste in arranging the window exhibit—and a good exhibit is well worth while.

Value of Special Demonstrations

While the display room should probably be as spacious in a small city as it would be in a larger one, at the same time the expense in maintaining the room and conducting demonstrations may be proportionately greater in the larger community. From the standpoint of the electric company, the display room may well be used as a means of educating the public in the use of the appliances exhibited. For this reason a company would be justified in having an expert in charge who could not only attend to

the every day duties in connection with the care of the display room, but also could give demonstrations on pre-arranged days. It goes without saying that the display room should be conducted under the general direction of the chief of the company's contracting department, and the dates for the different demonstrations should be so arranged that parties who would be particularly interested in any demonstration could be duly notified by the salesman. It might be a good plan to have a special demonstration one day each month. The demonstration should be preceded by a talk on the general character and utility of the appliances to be shown, and the salesman should be available to assist in the work of exhibiting and explaining the uses of the different devices. The special days should be divided in somewhat the same manner as suggested for the segregation of the exhibits in the display room. For instance, one day in each month might be given to electric cooking, and such a demonstration should have the assistance of a first-class cook so that the articles of food prepared and distributed may demonstrate how well they are cooked and how good they taste when electricity is used. During summer months special attention should be directed to those appliances which are particularly useful in hot weather, such as fans, cooking devices, small refrigerating plants, laundry machines, dish washers, vacuum cleaners, and the many appliances of the character which lighten work for the housewife. In the winter months, more attention might be given to electric heating appliances such as radiators, foot-warmers, heating pads, hot water bottles and the like. Now and then special demonstrations might be given for those interested in shop and factory work. There is a large field for development in this line, including such appliances as glue pots, soldering irons, breast drills, heaters, etc. However, the actual demonstration of such apparatus may not be suitable or appropriate in the ordinary display room, as usually such demonstrations would be more effective on the premises of the prospective purchasers. In a general way, it has been found that demonstrations create interest and spread knowledge, where knowledge and interest did not previously exist, and that, if properly conducted, all demonstrations as to the use of electrical devices are quickly followed with increased amount of inquiries and more frequent sales.

Joint Electrical and Food Exhibits

While all classes of people are now beginning to be more familiar with the uses of electricity in daily life, the great majority as yet know little regarding its true usefulness as a labor saver and real servant of man. In the minds of many there is still a mystery about its generation and distribution, which is largely inherited and sometimes difficult to shake off. By means of electrical exhibitions the public is brought in closer touch with the handling of electric energy and the practical uses to which it may be put in every walk of life. It is true that every electric appliance installed in a home or shop becomes an exhibit in itself, but as a rule this exhibit is confined to the personal acquaintances of the one on whose premises the installation has been made. By means of the electrical exhibit the attention of the public is drawn to the advantages of electric energy in a general way as well as to some of the more unusual uses. Each individual who visits a display or exhibition, while he may look at the many kinds shown, will have his special hobby and will be more interested in those particular appliances which are nearest to his every-day work and method of living. It is true that one-half the world does not know how the other half lives, and it is also true that one-half of those using electricity do not know in what manner the other half is utilizing the same kind of energy. The prime value of the exhibit lies in the fact that it tends to bring the two halves together, allowing them to intermingle and absorb the knowledge gained from the experience of others.

The exhibition and preparation of certain articles of food in a display room is often of distinct advantage. There is cleanliness about the use of electrical energy for cooking purposes that makes

Window display of the Beacon Light Company, Los Angeles, California, featuring lamps. The best possible equipment is none too good for the show window, and the greatest care should be taken in selecting color scheme, decoration, and illumination. A tasteful window will attract many customers into the display room.

such an exhibit particularly attractive to the careful housewife—and as everyone must eat to live, the food exhibit is usually of interest to all, and a good adjunct to a display of cooking appliances. The adaptability of electric energy to the manufacture of foods is undeniable. The preparation and serving of all kinds of edibles can be demonstrated in such a manner that the brands of food, electrically prepared, become more interesting and more attractive to the public—the value of the food being enhanced and the consumption increased because electricity is used in its preparation.

The prime value from the central station standpoint of the display room and electrical exhibit is in stimulating the consumption of the company's product, and in adding business along lines which will be most profitable. There is a great diversity in the hours of use of all electrical appliances, and this diversity makes the added load very attractive to the company distributing electric energy. Most of such appliances are used during the daylight hours, when the average electric company has the least demand for its energy, and consequently the added load during off peak hours is unusually attractive. Again, most of the lamp socket appliances installed on the lines of an electric company mean additional load without additional investment, and the income from such added load is at the maximum rate per kilowatt-hour, as service is supplied through the lighting meter. This condition applies to all appliances using 600 watts or less and includes irons, toasters, percolators, chafing dishes, heating pads, foot warmers, radiators, vacuum cleaners, washing machines, fans, vibrators, and scores of other devices which may be put in operation in any room or place where circuits are installed for electric lighting. Such additional load does not mean the addition of more lines, transformers, services or meters, but on the other hand it produces a better utilization of the present investment—the ideal class of added business —the most desired by any central station manager. The more a company's lines can be packed with the lamp socket load, the nearer such company will have attained ideal operating conditions. There is a goal all good operators desire to reach, the gates of which are Minimum Investment, High Load Factor and Maximum Rates. The lamp socket appliance load in sufficient quantity will open all three of these gates.

The Educational Factor

The properly conducted display room will naturally aid in removing from the public mind any prejudice regarding the use of electricity, either as to a mysterious uncertainty lurking in the background or as to the cost of service; and will do much to educate the people regarding the far-reaching advantages to be obtained from the use of the electric servant whenever and wherever possible. At the present time this applies particularly to energy used in the home. Reliable help is becoming scarcer and more expensive each month and a greater number of families are compelled to do their own housework. The uses of electricity materially lighten the labor in the home, and when this is fully realized the bugaboo of housework will gradually be lessened or entirely dispelled, and then the demand for electrically operated appliances will probably be greater than the supply. Further, the advantages of electric cooking are now beginning to be understood, and as the understanding increases, electricity will be more generally used in the kitchen, because of its cleanliness, convenience and utility. The question of comparative fuel cost will eventually be of little moment. House lighting may still be done by means of other illuminants at less cost than by electricity, but because of its compensating advantages almost everyone wants electric lighting. The same condition will one day prevail regarding electric cooking. There are compensating advantages in saving of time and labor, and in quantity and quality of food cooked, that far out-weigh any minor consideration such as fuel cost. The time is not far distant when all central station operators will require to be prepared for the load which is coming from this direction. The main factors which will hasten the day are exhibition, demonstration, education and the maintenance of high grade service to all cooking installations already made. In this connection well conducted display rooms keep electrical matters constantly before the public, and are of real educational service to consumers and at the same time of distinct advantage to all branches of the industry.

An advertising device used by the Western Colorado Power Company to promote the sale of electric washing machines. On the back of each calendar slip are illustrations of washing machines with descriptive reading matter.

Electrical Statistics From the Northwest

(Development of all branches of the electrical industry in the West has been phenomenal during the past few years. The following figures, giving some idea of the resources and growth of the Northwest, are typical of the steady expansion which is in progress on the Pacific Coast. —The Editor.)

Oregon's Water Power

NO. 1. UNDEVELOPED PROJECTS WHICH HAVE BEEN INVESTIGATED BY THE STATE

Stream	Project	Continuous Horsepower	8 Months Season Horsepower	River Discharge	Head	Estimated Cost	Remarks
Columbia	Cascade	200,000	420,000	50,000 S.F. Min.*	44 ft.	$11,000,000.00	Est. exclu. of dam.
Columbia	The Dalles	480,000	800,000	50,000 " "	45 to 105 ft.	50,000,000.00	
Columbia	Umatilla	120,000	320,000	40,000 " "	35 ft.	20,500,000.00	Est. for 320,000 e.h.p.
Deschutes	Moody	54,000		4,500 " "	132 ft.	4,560,000.00	3 mi. from Col. R.
Deschutes	Lockit	28,630		4,500 " "	70 ft.	1,901,000.00	14 mi. from Col. R.
Deschutes	Reclamation	37,600		4,500 " "	92 ft.	2,328,000.00	20 mi. from Col. R.
Deschutes	Sinamon	35,600		4,500 " "	87 ft.	1,778,000.00	29 mi. from Col. R.
Deschutes	Oak Brook	26,500		4,500 " "	65 ft.	1,610,000.00	37 mi. from Col. R.
Deschutes	Sheras Falls	40,900		4,500 " "	100 ft.	3,742,000.00	44 mi. from Col. R.
Deschutes	Oak Springs	10,820		3,700 " "	32 ft.	1.254,000.00	49 mi. from Col. R.
Deschutes	Maupin	44,500		3,700 " "	132 ft.	4,472,500.00	53 mi. from Col. R.
Deschutes	Freida	47,360		3,700 " "	140 ft.	4,716,800.00	63 mi. from Col. R.
Deschutes	White Horse Rapids	47,200		3,700 " "	138 ft.	3,039,000.00	77 mi. from Col. R.
Deschutes	Coleman	19,680		3,700 " "	58 ft.	1,840,000.00	89 mi. from Col. R.
Deschutes	Mecca	27,760		3,400 " "	90 ft.	1,878,800.00	98 mi. from Col. R.
Deschutes	Pelton	18,560		3,400 " "	60 ft.	1,052,800.00	107 mi. from Col. R.
Deschutes	Metolius	64,960		3,400 " "	210 ft.	3,954,800.00	111 mi. from Col. R.
Metolius	Riggs	17,200		1,400 " "	135 ft.	1,626,000.00	
Metolius	White Water	28,360		1,200 " "	260 ft.	2,115,800.00	
Metolius	Jefferson Creek	36,360		1,000 " "	400 ft.	2,751,800.00	
Metolius	Jacks Creek	16,360		600 " "	300 ft.	2,781,800.00	
Snake	Palouse Rapids	50,000		17,000 " "	32 ft.	4,500,000.00	With storage.
Snake	Asotin	80,000		15,000 " "	60 ft.	6,600,000.00	With storage.
Snake	Coon Hollow	200,000		15,000 " "	210 ft.	15,200,000.00	
Snake	Cherry Creek	300,000		15,000 " "	200 ft.	18,100,000.00	With storage.
Snake	Mountain Sheep	300,000		15,000 " "	210 ft.	16,400,000.00	With storage
Snake	Salmon Riv. Tunnel	200,000		4,000 " "	505 to 530 ft.	19,215,000.00	
Rogue	Devils Stair	30,000		1,350 " "	100 ft.	2,100,000.00	
Rogue	Horsehoe Bend	30,000		1,350 " "	110 ft.	2,100,000.00	
Klamath	Klamath Falls	70,000		1,160 " "	700 ft.	6,400,000.00	
Totals:		2,662,350		*Stream flow minutes		$219,518,100.00	

NO. 3. DEVELOPED AND PARTIALLY DEVELOPED PROJECTS

Stream	Date of Filing	Total Theoretical Horsepower	Power Now Developed Estimated
Rock Creek	1903	2045	1500
Mill Creek		614	614
Sheep Creek	1901	750	750
Lake and Lost Creeks	1902	3409	3409
Mill Creek and Santiam	1859	1804	1804
North Fork Santiam	1857	650	200
Willamette River	1860	600	600
Walla Walla River	1887	563	563
Tualatin River	1878	6818	3000
Fruit and Horse Creeks		252	252
East Fork Hood River	1905	1219	1219
Umatilla River	1870	685	685
Wallowa River	1907	410	410
South Fork Santiam	1874	1023	1023
Santiam River	1870	200	200
South Santiam River	Prior to 1909	897	897
North Santiam River	1866	1500	1500
North Umpqua River	1891	961	961
Mill Creek	1876	273	273
Molalla River	1909	239	239
Hood River	Prior to 1909	10227	1000
White River	Prior to 1909	4233	3000
S. Fk. Walla Walla River	Prior to 1909	6564	3500
Mill Creek	1909	569	None
Crooked River	1910	5000	2500
Rogue River		3000	None
Warner Creek		2525	None
Pine Creek		500	500
Clackamas River		15000	None
Loon Lake Reservoir & Mill Cr.		1218	None
North Umpqua River		5454	None
Clackamas River		11705	None
Sandy Creek		20000	None
Zig Zag & Walla Walla Rivers		460	460
Clackamas River		36818	None
Sandy & Little Sandy		36932	20000
Pine Creek		200	200
Three Links Cr., Oak Grove Fk. of Clackamas River, Baker C.		57272	20000
West Fork Deschutes River		300	300
Deschutes River		9546	2000
Hood River		5409	1500
Deschutes River		11818	5000
McKenzie River		5000	1000
Right Fork Rocky Gulch		10750	2000
Clackamas River		425	None
Willamette River		28409	None
Silver Creek		136363	50000
Rogue River		1875	1875
Powder River		3409	3409
Link River		409	409
Link River		563	563
Wallowa River		1118	1118
		236	236
Rock Creek		205	205
Santiam River		1078	1078
Wallowa River		426	426
Bridal Veil		787	787
North Fork Santiam River		600	None
Mill, Bar & Red Blanket Cks.		5645	None
Klamath River		588	588
Klamath River		1500	None
Eagle Cap Reservoir		525	None
East Fork Pine Creek		271	271
South Fork Umpqua River		341	341
North Fork Rogue River		22727	6000
North Santiam River		205	None
Willamette River		887	887
Big Butte & Ginger Creeks		312	None
Rogue River		500	200
Totals:		487,187	151,452

NO. 2. OTHER POWER POSSIBILITIES WHICH HAVE NOT BEEN INVESTIGATED BY THE STATE

Stream	Flow	No. of Sites	Horsepower
Clackamas River	1,000 sec. ft.	1	11,700
McKenzie River	600	4	195,000
Umpqua River	1,000	2	32,700
Santian River	500 to 750 sec. ft.	4	52,500
Total			291,900

SUMMARY

No. 1 Undeveloped Projects Investigated by the State	2,662,350 hp.
No. 2. Other Power Possibilities	291,900 hp.
Developed and Partially Developed Projects	487,187 hp.
Totals	3,441,437 hp.

Of this total horsepower reported it is estimated that there is actually developed and being used 151,452 hp., as shown under No. 3 above, or less than five per cent of the total horsepower above listed. While developed projects of less than 200 horsepower have not been listed it will be noted that the un-

developed projects reported are in most cases not complete development of the streams covered, also that there are hundreds of smaller power possibilities throughout the state that have not been investigated.

HYDROELECTRIC POWER POSSIBILITIES IN PUGET SOUND DISTRICT

BY J. J. WETTRICK

The waterpower tributary to the Puget Sound region I have arbitrarily assumed to be the power found in the streams of the western slope of the Cascade Mountains from the Columbia River to British Columbia, the eastern slope of the Olympics, the Klickitat River and one-half of that in the Columbia River between Celilo and the mouth of the Cowlitz River. There are many good power sites capable of large development on the Yakima River and other tributaries of the Columbia, and the Columbia River itself that are nearer Seattle and Puget Sound than some of those included in the above territory, but it is thought that this power can readily find profitable employment in the commercial and irrigation industries in the great region to the east of the Cascade Mountains.

In the region above described, reports of the United States Geological Survey (on basis of maximum continuous power on the turbine shaft) give the rivers flowing into the Columbia, including the Klickitat, White Salmon, Little White Salmon, North and South forks of Lewis River, The Toutle and Cowlitz rivers a total of 494,550 horsepower. Investigations show that with economically possible storage this amount could be doubled, making a total of approximately 989,000 horsepower continuous.

The Nisqually, White, Puyallup and Cedar rivers are given totals of 215,970 and 127,280 horsepower, according as they are considered with or without storage. Continuing on north are the Snoqualmie with 60,000 horsepower, Sultan River with 25,000, the Whitechuck, Sauk, Skagit, Nooksack, Stillaguamish, Skykomish and other small rivers for which no government estimates are available, but which would in all probability furnish in the neighborhood of 300,000 horsepower.

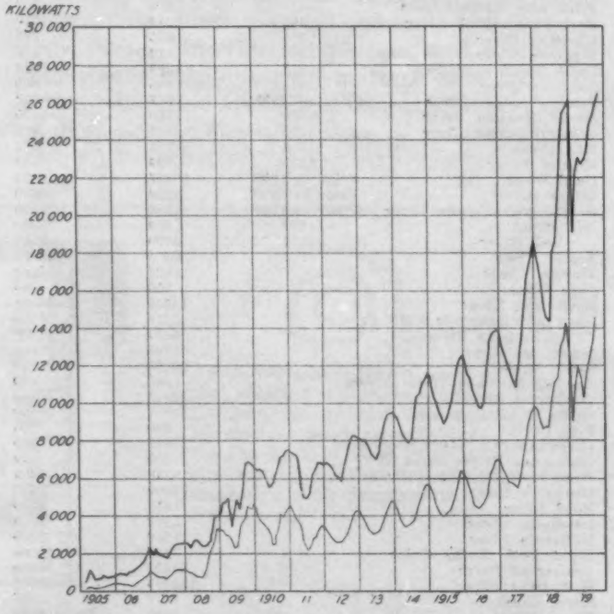
On the eastern slope of the Olympic Mountains is the Lake Cushman project, which has been estimated to be capable of developing anywhere from 30,000 to 150,000 horsepower continuous. The Elwha River, on which an 8,000 horsepower plant is now practically completed, according to estimates of competent engineers, is capable of development to the extent of furnishing 35,000 horsepower continuous. Other streams in the eastern portion of Clallam and Jefferson counties have been estimated to be capable of furnishing 50,000 horsepower continuous.

Then there is the Columbia River, the greatest of them all. At one point on this river, between Celilo and The Dalles, it is estimated that 300,000 electric horsepower continuous can be developed and generated at a cost of $7.00 per horsepower year and an additional 236,000 horsepower for eight months of the year. These estimates are by John H. Lewis, State Engineer of Oregon, and he makes the further statement that "an additional one million horsepower can be developed at a cost of $44.00 per horsepower and furnished at a cost of $4.50 per horsepower year, "thus making a total of approximately one and a half million horsepower for this one site. Assuming that one-half of this or 750,000 horsepower is available for Washington, letting the other one-half go to Oregon, and adding to this the various other amounts above mentioned, we have the amazing total of 2,455,000 horsepower available in the Puget Sound region. This total, while based for the greater part on comparatively rough government estimates, can be said to be a very conservative estimate.

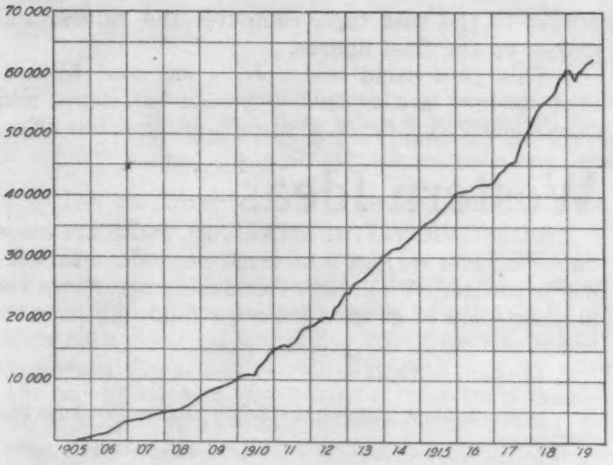
WATER POWERS OF THE STATE OF WASHINGTON
(From preliminary and reconnaissance notes prepared by the Department of Engineering of the University of Washington.)

	Drainage area	HP. Entire 12 months at cost of $1.50 per HP. or less	HP. Estimated average for year irrespective of distribution or cost
1.	Cowlitz River	230,000	1,500,000
2.	Toutle River	48,000	320,000
3.	Lewis River	55,000	450,000
4.	White Salmon River	60,000	220,000
5.	Nisqually River	45,000	225,000
6.	Puyallup River	40,000	175,000
7.	White River	110,000	285,000
8.	Cedar River	75,000	200,000
9.	Snoqualmie River	100,000	400,000
10.	Skykomish River	85,000	240,000
11.	Stillaguamish River	50,000	220,000
12.	Skagit River	250,000	1,200,000
13.	Klickitat River	118,000	300,000
14.	Chelan River	300,000	500,000
15.	Spokane River	80,000	240,000
16.	The Olympics	160,000	850,000
17.	Columbia River (with tributaries not mentioned)	750,000	5,800,000
	Total	2,556,000	13,125,000

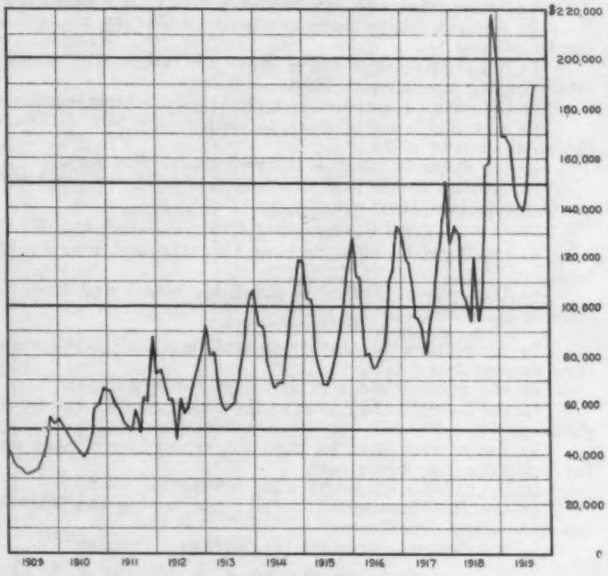
CHARTS SHOWING GROWTH OF SEATTLE MUNICIPAL LIGHT AND POWER SYSTEM



Maximum and average load by months in the Seattle municipal power plant. Household appliances have become an appreciable proportion of the load on the system during the last five months.



Number of customers on the Seattle municipal light and power system between the years 1905 and 1919. The steady increase is indicative of the growing popularity of electricity in industries and in the home.



Monthly earnings of the Seattle municipal light and power system. The unusual increase in load and revenues in 1917, 1918 and 1919 was due to shipyards and allied industries. Electric steel furnaces have also become an important load in the last three years, and the household appliance load has increased by about one-third during 1918 and 1919.

MANUFACTURES CENSUS

Special effort is being put forth to make the manufactures section of the approaching Fourteenth Decennial Census the most complete and comprehensive inventory of the Nation's manufacturing establishments ever taken, according to officials of the Bureau of Census who have this work in charge.

The schedules which will be used in tabulating the information about the country's industrial resources have already been prepared and printed. These schedules will be mailed to every manufacturing establishment in the United States so that factory owners and managers can familiarize themselves in advance with the questions to be answered when the records of the past year's business have been compiled. The questions relate to the calendar year 1919.

In 1914, the year the last manufactures census was taken, about 275,000 manufacturing establishments were listed by the Census Bureau. This time more than 300,000 establishments will be sent schedules. In addition to this it is expected that about 50,000 mines and quarries will also be reported.

The inquiries relating to manufactures, as specified by the Act of Congress providing for the census, include the name and location of each manufacturing establishment; character of organization, whether individual, corporate or other form; character of business or kind of goods manufactured; amount of capital actually invested; number of proprietors, firm members, copartners and officers, together with the amount of their salaries; number of employees and amount of their wages; quantity and cost of materials used in each establishment; quantity and value of products; principal miscellaneous expenses; time in operation during the year; character and quantity of power used; and character and number of machines employed.

The questions as outlined above will be covered by the general schedule which every establishment will receive. In addition to this a supplemental schedule will be sent to the 68 principal industries as classified by the Census Bureau. This supplemental schedule will allow detailed statistics of output to be set forth under the heading "products manufactured."

The census of manufactures is limited to manufacturing establishments with an annual product of at least $500 conducted under what is known as the factory system, exclusive of the so-called neighborhood, household and hand industries. However, no establishment is too small to be counted by the government if it comes within the definition of a manufacturing establishment.

Census Bureau officials emphasize the fact that all information gathered by the census is strictly confidential, made so by the Act of Congress, and is for general statistical purposes only. The same is true of the censuses of population, agriculture, mines and quarries, oil and gas wells and forestry and forest products.

Many startling figures are expected to be shown by the approaching compilation inasmuch as the industries of the country were for the most part in a subnormal condition in 1914, the year the last manufacturing census was taken.

ELECTRIC LIGHT AND POWER STATISTICS FOR OREGON

Figures regarding electric light and power companies, given in the eleventh annual report of the Public Service Commission of Oregon, show the growth of the electrical industry in Oregon as follows:

	Fixed Capital Installed			No. of Electric Customers
	Entire System	Oregon State	Oregon Electric only	in Oregon
1916	$139,991,837.38	$68,491,717.79	$ 8,603,615.76	84,172
1917	142,349,147.38	74,316,051.73	12,045,065.99	88,236

TAKING AN INVENTORY

BY H. R. OLSON

(A practical inventory method for wholesalers, and one which has worked out successfully in a large electrical concern, is here described by the bookkeeper and cashier of the Pacific States Electric Company of Portland, Ore.—The Editor.)

The subject of inventory is of particular importance at this time of the year, many firms closing their fiscal year with the calendar year, and many others taking inventory shortly after the first of the year.

While there are many good plans for inventory, the one to be briefly outlined here has been found well adapted to the jobber stocking approximately five thousand items.

With this comparatively large number of items the actual count is completed within a short time; and the compilation, recording, and reconciliation of these figures against stock records is finished within a few days.

Naturally a schedule like this requires careful planning, a thorough understanding of the routine and procedure by each employee, and a complete coordination of all parts of the work.

We employ what is commonly known as a stock card record system—one card being used for each item of stock. On this card is a record of material ordered, received, and disbursed. A glance will show the stock of that particular item on hand. We operate several branches and use the same general plan at each office.

Well in advance of the actual inventory, the main office prepares for each district office an "Inventory Tag" for each stock card, different colored tags being used to designate different offices. For the purpose of this article, let us assume that the stocks at the respective offices are identical. The tags are numbered consecutively and in the same order as the stock cards.

At the same time, a "Cost Tag" is prepared for each stock card, and the items are costed in advance of the actual count. The cost tag is designed for tabulating the stock of the article at each office and arranged so that the district office value of the article will be available.

A few days before inventory, the tags are distributed in the respective warehouses and a survey is made to see that every item has a tag before the actual count is started.

We divide the employees into little crews composed of foremen and assistants, usually a foreman for each floor. It is the duty of the foreman to see that the count is taken, checked, and properly entered on tag, and that no items have been omitted in his section.

The tags are collected, arranged in numerical order, and compared with stock cards, the actual cost being entered on the district office cards. In cases where the count and the stock record differ, due to inaccuracies, a check of the stock is made to verify the original count before entry on cards.

When a district office has completed the card entries and all tags are accounted for, they are forwarded to the main office. That office transfers the counts to the cost tags, computes the values, and makes up the final figures.

This plan could undoubtedly be used by any firm stocking a considerable number of items, and in particular by a firm operating more than one office.

Western Ideas—

CUSTOMERS FOR SMALL MOTORS are more numerous and various than some electrical establishments realize. A number of valuable suggestions for prospects can be gleaned from the following recently compiled list:

Small Power Users

In the laundry to drive the washing and ironing machines.

In the bakery to drive the dough mixers and kneading machines.

In the confectionery to turn ice cream freezers, chocolate mixers, etc.

In the dairy to turn the separator, churn and bottle washer.

In the printing plant to drive the big cylinder and the small job presses.

For mechanics who like to tinker about their own shops.

In garages where there are tools to sharpen and grinding to be done.

In the repair shops where there are lathes, drill presses and grinding machines to drive.

In the pattern shops to turn the wood-working machines.

In saw and planing mills to replace the belt drives of the steam power plant.

In tin shops to operate the power-driven shears.

In awning shops and sail factories to drive the heavy sewing machines they use.

Professional Men

In the dentist's office to turn his lathe and sharpen his tools.

In the optician's office to grind his lenses and keep his tools in good shape.

Retail Dealers

In the window to provide special "motion" displays and turn the revolving table.

In the grocery store to drive the coffee grinder.

In the butcher shop to turn the meat grinder and bacon slicer.

In the jewelry shop to drive the repair man's lathe and for polishing the silverware.

In the tailor shop to drive his sewing machine.

In the furniture store to drive the sewing machines of the upholstery department.

In the department store for the same purpose.

On the Farm

In the dairy to drive the milking machines.

In the dairy to drive the separator and turn the butter churn.

In the barn to drive the corn sheller and feed grinder.

In the spring house to drive the pump that supplies running water for the house and barn.

Mounted on a skid to drive the ensilage cutter and blower, saw wood, etc.

In the Home

In the laundry to drive the washing machine and wringer.

In the laundry to drive the ironing machine.

In the basement to drive the soft water pump.

In the shop to turn the lathe and grindstone.

In the garage to sharpen tools and turn the lathe.

In the basement to turn the ice cream freezer.

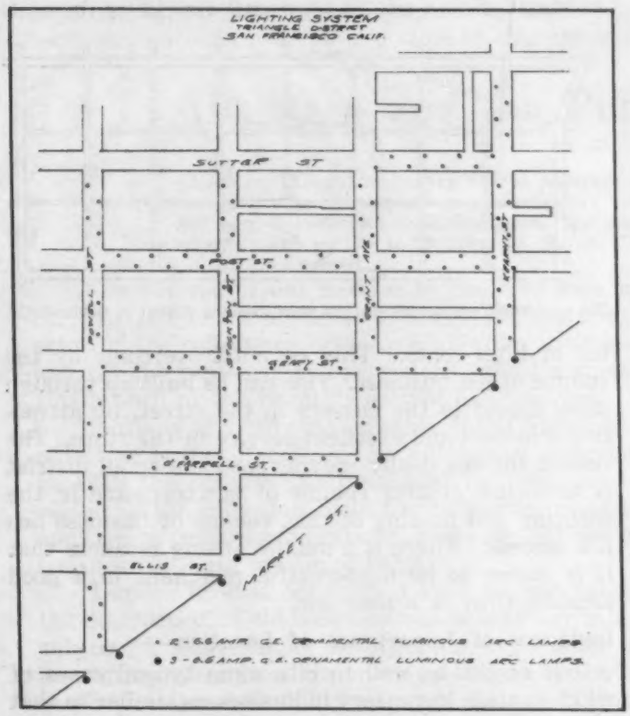
THE GUARANTEE OF QUALITY which goes with a standard well-known make is the electrical dealer's greatest advantage over his competitors in the retail field. Other establishments may feature cheapness, mail-order facilities, and so forth, but the regular contractor-dealer has the big concerns of the industry directly behind him and is in a position to feature quality, and goods with an established reputation—and he should make this fact one of his main drawing cards.

The Store Location

BY HOWARD ANGUS

(Figures show that the great majority of the buyers of electrical appliances are women. For this reason, if no other, it is important that the dealer locate his store in a district frequented by women shoppers. The following article by the secretary of the California Electrical Co-operative Campaign discusses the connection between location and business.—The Editor.)

The electrical contractor-dealers of California have completed one of the most prosperous years in their history. They are facing, together with the other forces of the electrical industry, what many predict will be the banner season to date. At this time each electrical contractor-dealer should be busy analyzing his business and discovering what were the salient features that made for his success in 1919, and what, if anything, retarded his progress. He should face 1920 with a carefully planned program. Efficiency in business coupled with better service to



The triangle district of San Francisco which includes most of the important stores of the city.

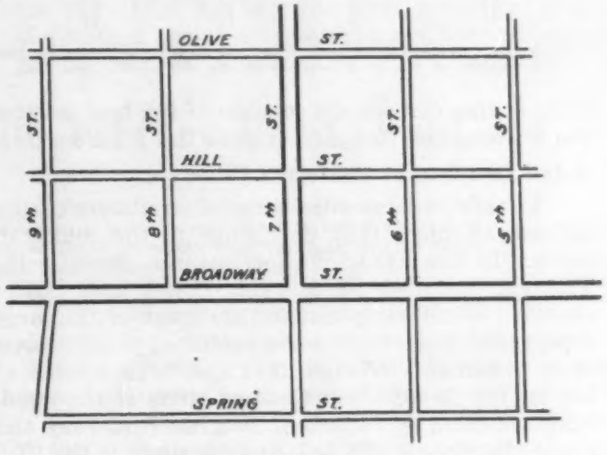
the public must of necessity be the keynote of this program and he should be determined that he will be contented only with more business than he did during the past year.

At this time the Advisory Committee of the California Electrical Co-operative Campaign wishes to call the electrical contractor-dealer's attention to the importance of store location.

It has been said that location makes or breaks a business. The Advisory Committee considers location of first importance to the electrical dealer, as it is to any other man engaged in retail merchandising. The Advisory Committee is convinced that many dealers were handicapped during the past year by poor locations and that they succeeded in many instances in spite of location rather than by its help.

The Best Store-Situation —

As a general rule the best location is where the people gather in the greatest numbers. This might be further qualified and the best locations defined as those streets on which the women shoppers are the most numerous. Much of the purchasing for any family is done by the women. They are free during business hours of the day, while the head of a family is working. For instance, it has been discovered that a poor location is on the road that men take to or from a factory where they work. The reason for

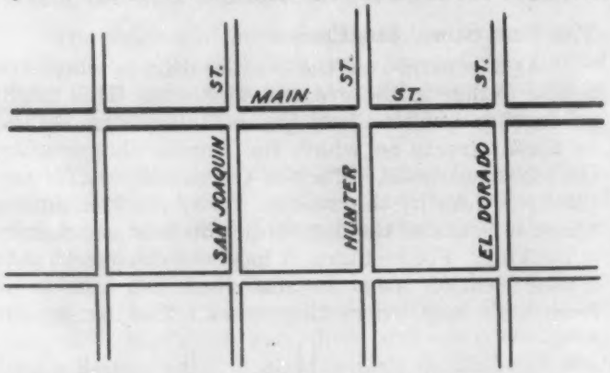


The Los Angeles "T," the scene of most of the retail shopping of the city, and the best location for stores.

this is that they are in a hurry to get to the factory and in a hurry to get home and have no time to make purchases; and another reason is because their wives, mothers or sisters do the buying and are not to be found on the street that leads to the factory. If this has been found true, and reliable authorities confirm it, then the electrical dealer should have his store where the women shoppers are most numerous. He has still another reason for seeking the streets where the women are, because he sells appliances and conveniences for the home, and practically all the buying for the home is at the instigation of the woman in charge of that home and the purchases made either by her or at her request.

In every city there is a district known as "the retail district" where women shop. This district has been established by time, and it would be difficult to break a woman from the habit of going to that district and seeking out another in which to make her purchases. This district as a general rule is marked by the large department stores, with the specialty merchants' shops sandwiched in between them. The streets that are traveled most frequently by women are those between these department stores and it is on these streets that the women do their "window shopping," make up their minds as to what they wish to buy and it is here that they eventually do make

the purchases, in nine cases out of ten. Merchants have learned from experience that these streets are the best streets, and the bidding by merchants for locations on them have forced up the rentals for these districts. The large rent they endeavor to overcome by the increased volume of business. Corner loca-

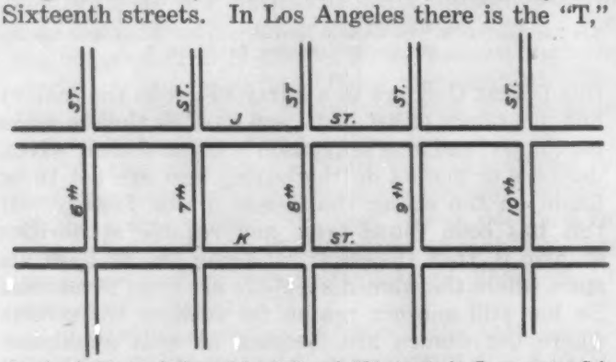


A triple cross, formed by one main street and three cross streets, comprise the majority of the good locations in the city of Stockton, Cal.

tions in this district are considered the best because the travelers of two streets pass the location.

Retail Districts in California Cities —

Usually in large cities these districts are clearly defined, although they do change in the course of years. In San Francisco, for instance, there is the Triangle, bounded by Market, Powell and Sutter streets. Within this district are most of the large department and other well-established retail stores. It is within this triangle that the large volume of the buying is done. In Oakland there is the quadrangle marked by Jefferson, Twelfth, Broadway and Sixteenth streets. In Los Angeles there is the "T,"



On the double track formed by "K" and "J" streets in Sacramento, Cal., is located the shopping centre of the city.

marked by Broadway from Fourth to Ninth and by Seventh street from Broadway to Hope street, with a brisk business on Spring and Main streets besides. In Sacramento "K" street is the heart of a retail district formed by the "K" and "J" streets "double track."

The next best location to a location in the heart of the retail district is close to this district and on some well defined avenue of approach to it. In other words these merchants established here are trying to catch the crowd, going and coming.

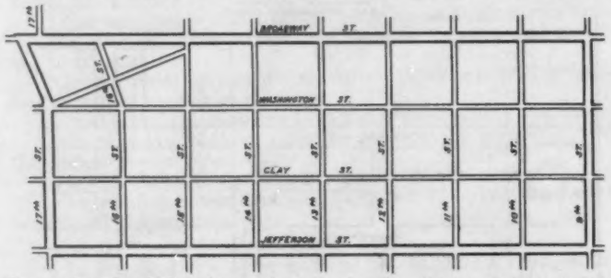
In large cities auxiliary shopping centers will be found in all of the residential districts. Here will be found butcher shops, grocery stores, drug stores and the like, and many electrical merchants are conducting successful enterprises in these districts. As a general rule merchandising in one of these auxiliary centers is limited to the district. Of necessity the scope of the merchant's business is limited by his location and his work must be intensive rather than extensive.

Choice locations are next door to the power company where the consumers go to pay their bills, next to a moving picture theatre and at street car transfer points where people of necessity must stop and look around. These have been found, in many cases, of real monetary value to the retail merchant.

In the Small Town, the Main Street —

In smaller cities the main street is the shopping district and on that street is usually the best location for the electrical retailer. A location close to the bank is usually a good one; so is a location near the power company office.

The chief problem that every dealer has to face in considering a site in the retail district is the mat-



The quadrangle which embraces the main shopping district of Oakland, Cal.

ter of high rents. This he must overcome by the volume of his business. This can be built up through sales appeal to the passers in the street, by attractive windows and excellent service in the store. The reason for the dealer moving into the retail district is to secure greater volume of business, and in the securing and holding of that volume of business lies his success. There is a maxim among retailers that it is easier to be a successful merchant in a good location than in a poor one.

Instances of Importance of Location —

It might be well to cite some typical cases of what location has meant in businesses similar to that of the electrical dealer. There is a man in a certain large Pacific Coast city who owns a book store. It is located in the heart of the shopping district. His rent is $1,750 per month. When asked how much location had contributed to the success of his business, this book dealer replied that it was the secret of his whole success. When asked what would he consider a just rental for any location other than in the center of the retail district he thought a while and said, "I would have to be given $500 per month by the man who owned the building before I would even consider moving, and then I would probably turn down the proposition." In other words he estimated that his location was worth $2,250 a month to him. He is at present a very wealthy man. He began with nothing.

Sometime ago in the same city there was a firm engaged in the sporting goods business. The store was not in this general shopping district. The two

men who comprised the firm dissolved partnership. One staid in the old location and the other moved into the heart of the retail district. The man who staid in the old location has only a mediocre business. The man who moved has made such a success out of his sporting goods business that he has been able to secure control of one of the large department stores of that city. While there may have been other contributing influences to the success of this book store man and this sporting goods dealer, the chief element of their success has been location—a subject which merits the serious consideration of every retailer.

While many other cases might be cited, these two are mentioned because the profits in their business are about the same as those of the electrical retail merchant and the class to which they cater is much more limited.

It might be well to call attention to the method employed by a certain tobacco corporation which has been very successful. Before a store of this concern is even placed a careful study is made of the location and the actual number of possible cigar purchasers counted and tabulated according to the hours and days for at least a week's time.

It would be profitable to an electrical contractor-dealer to cultivate the acquaintance of some of the successful merchants in other lines of business who have made successes in the heart of the retail district. He will be no doubt surprised by the limitation of appeal of many of these merchants' wares and he will find that the possibilities in the businesses of many of them are more confined and restricted than his. He will discover to his satisfaction that by good business methods backed by a good location he can do as well as his successful business friends.

It is undoubtedly true that a store to realize the greatest success must be where the people are, and the store that is where the most people are will do the largest business because it reaches and appeals to the greatest number of possible prospects.

Business and the Public Library in St. Paul

BY W. D. JOHNSTON

(Bringing the public library to the business man is largely a matter of advertising. The following article relates how a public library established a modern and effective business section, and how it keeps its facilities before the minds of those to whom they are intended to be of service. The author is librarian of the St. Paul Public Library.—The Editor.)

The success of our service to business men in St. Paul is due mainly to two things (1) the character of the collections made available for their use and (2) the extensive and persistent publicity which this branch of the library's service has received.

Perhaps the only remarkable thing about the collection is that it contains no antiquated material. In 1915 the library was destroyed by fire, and in restoring the collection little has been purchased in addition to current publications, and new editions of books which have proven of value.

I speak of this not with a view to suggesting the destruction of old books on business or any other subject; I want simply to urge the importance of separating them from the more up-to-date books, to emphasize the desirability of open shelf display of the more useful books, and decent interment for the less useful ones. It is the latter which too often discredit libraries among men of affairs, and stand in the way of the use of the books which are of practical value. A large collection of books is in itself forbidding to anyone except the academic personage, but when a large part, if not the major part, of the collection is of historical interest only, the collection is not only forbidding in appearance, but repulsive.

Unique Publicity —

The most remarkable feature of the development of our business service, however, is the publicity which it has received through the newspapers, through business organizations and business houses and through the library's own publications.

The cooperation of the newspaper press was obtained by the Town Criers, the local association of ad men.

The library fire occurred April 27, 1915. On June 2, the Town Criers voted to appropriate one dollar per member for the establishment of a business department in the public library and appointed a library committee to formulate plans for levying a tax upon the rest of the business community and incidentally give as much publicity as possible to the new department at the library.

The manager of the St. Paul Daily News offered to publish a special Town Crier edition of the newspaper. An editorial staff was at once organized, the mayor of the city issued a proclamation, calling attention to the civic importance of the movement, and appointing June 17 as Town Criers library day, and posters announcing it were placed in store windows.

The special library edition of the News consisted of the regular edition of the newspaper enclosed in a special four-page section devoted to the Town Criers and their library project. This section contained articles on the business library, on libraries in business establishments and similar material. Among them were interviews with prominent men, editorials, and verse.

The business section of the city was districted and each Town Crier, a newsboy for the time, assigned a route. The automobiles that carried the Criers from the News office to their several districts were decorated with signs reading "Town Criers' Library Edition, Daily News." Each Crier wore a large round tag bearing the same legend, and also carried a coin box. Many newspapers sold at a premium, and as a result over four hundred dollars was raised for the establishment of the business library.

A Book Department in the Local Newspaper —

More recently a book department has been established in the older of the two largest local

BUSINESS BOOKS

An Index to Recent Books and Articles in Magazines of Interest to Business Men

Published monthly by the St. Paul Public Library

W D FRITZ St Paul Association of Credit Men, W D. McILVAINE, St Paul Association of Office Men W F OLDHAM, St Paul Advertising Club
Editors

VOL 1 May, 1919. No. 12

BUSINESS EXPERIENCE PLUS

In his new book, entitled Principles of business, Professor Gerstenberg says. Fortunately for the business man, testimony is becoming an ever-increasingly abundant source of business information Ten years ago there were few books indeed on business. Economic theory occupied the attention of students much more than the facts of business Where then one or two books appeared now they are being written and published by the hundreds.

The business student of course, observes as well as reads. Today however so vast is the amount of information that must be acquired that testimony—as compared with direct observation—has become of relatively greater importance than it was under the old apprenticeship method of business education

The reading of business books marks the passing of the old time provincialism in business.

NEW BUSINESS BOOKS

Bank deposit building W R Morehouse N Y Bankers pub co 1918 254 p $3 00 Discusses the following kinds of advertising as means of increasing business newspaper community window display motion picture street car bank stationery and house organ with chapters on employees contests, school savings banks and Christmas savings clubs (1715)

Building, equipment and supplies. A W Shaw co Chicago 1919 193 p. $3 00 (Shaw banking series) Location and general construction planning the interior special equipment which pays how to reduce the cost of supplies (1716)

Management and executive control. A W Shaw Co Chicago 1919 328 p (Shaw banking series) $3 00 Essentials of management president and directors division of work records and audits hiring and training workers profit-sharing plans and social activities trust and savings methods profit factors (1717)

The successful salesman Frank Farrington Chicago Laird & Lee. 1918 298 p $1 00 The salesman, the customer the goods, the catalog, cooperation with the house, honesty optimism and push, selling yourself (1718)

What a salesman should know about advertising. J C Aspley Chicago Dartnell 1919 113 p $1 00 How advertising helps a salesman what a trade mark means using advertising to close sales, the wait-for-demand buyer opposition to advertised brands personal advertising (1719)

A monthly publication issued by the St. Paul Public Library, in co-operation with representatives of local business organizations, is an up-to-date record of the best current business literature.

newspapers. The character of this is indicated by the caption placed over it: "New books reviewed by readers of St. Paul. They tell what they think of late arrivals at the public library. Edited by the city librarian." These book reviews, unlike those in most newspapers relate less to fiction than to other books of general interest; business books are featured as often as possible, partly on the theory that they should be more widely used,—it should be necessary to have as many copies of the more useful business books in a public library as we now have of the more popular fiction,—and partly on the theory that it is a good thing for business men to do some book reviewing. Among the books which have been discussed in this way in our columns recently are Gerstenberg's Principles of Business, Beatty's Corporation Schools, Cleveland's Funds and Their Uses, Shaw Company's How to Run a Wholesale Business at a Profit, and Moore's American Business in World Markets.

Special articles on the library service to business men and on the literature of subjects of interest to business men as well as news notes are published from time to time.

The advertising columns are employed by the library also, and business houses use library notes as insets in their advertisements.

I am not sure that business men read any advertisements except their own, but I am told that business women do, and business women, I believe, will soon rival business men as users of business literature, if they do not already.

Miscellaneous Publicity —

If space permitted I should like to speak of the publicity which the service to business men has received through business organizations and business houses. Library committees of the Officemen's Association, the Credit Men's Association, and other business men's organizations have been equally active in assisting in the selection of books of special interest to their members, and in bringing them to their attention through bulletins, or circulars, and their program committee have arranged for talks on the library service and on business literature.

For It's Always Fair WEATHER When the Town Crier Boost for St Paul

THE ST. PAUL DAILY NEWS

TOWN CRIER LIBRARY EDITION

THIS NEWSPAPER RECEIVES THE FULL LEASED WIRE SERVICE OF THE UNITED PRESS ASSOCIATIONS.

VOL. 16, NO. 107 ST. PAUL, MINNESOTA, THURSDAY, JUNE 17, 1915. ANY PRICE YOU WISH TO PAY

ST. PAUL BUSINESS MEN INDORSE IDEA FOR NEW LIBRARY

Great Value of Plan for Adequate Reference Department Is Emphasized by Men Who Realize the Great Need of Special Department Planned by the Town Criers

MEANS MORE AND BETTER BUSINESS FOR ALL ST PAUL

Paving the Way to a Business Library . . . . By "Bart"

TEN THOUSAND BIG BUSINESS MEN WILL GO TO CONVENTION

Secretary Lane Will Make Opening Address at the Great Gathering of Advertising Forces in Chicago, Beginning June 20—A.A.C.W Has Active Members in 150 Clubs All Over the World

MOVEMENT GROWS IN ELEVEN YEARS FROM SMALL BEGINNING

PRESIDENT VINCENT INDORSES THE IDEA

Noted Educator Tells of the Importance of a Reference Library

BEER WILL BE ON SPECTACULAR NIGHT BOOMING BOOSTERS

Following the destruction of the St. Paul Public Library by fire a local newspaper issued a special library edition, in cooperation with the ad men of the city, to raise money for the establishment of a strong business department in the new library.

Individual business houses have followed their example, and have not only made the library service better known to employees but have done what they could to facilitate the circulation of books among them by securing traveling libraries for their use and arranging for messenger service between the library and the business house.

Of the library's own publications one is devoted to current business literature. It is entitled "Business Books," is edited in cooperation with representatives of three of the largest business men's organizations, and is distributed by the secretaries of these organizations to their members as well as to visitors to the library and to those on the library's mailing list.

In addition to this record of current business literature the library publishes lists on special subjects, both in folder form and in bookmark form. Among the former are lists on "advertising," "office work," "retail merchandising," "management," "employment," and "business finance." The latter cover a great variety of subjects.

Progress of the Great Western Caribou Project

A view of the tunnel construction which is an important part of the Caribou project now being carried out by the Great Western Power Company on the North Fork of the Feather River. 40,000 kw. are to be developed, just above the present Las Plumas plant, which now develops 65,000 kw. at a head of 425 feet.

A sample of the country through which it was necessary to build a railway to connect the construction camps with the Western Pacific Railway. The broad-gage road, which is put through half the distance, connecting with a narrow-gage on the other side of the ridge, now passes along the strip of rock here shown.

In order to facilitate tunnel construction, a shaft has been sunk from the ridge, which permits of a three-way activity. The tunnel capacity is 60,000 kw. and it is expected that 120,000 kw. may ultimately be developed from this project.

The sawmill in Butt Valley, built to furnish lumber for construction work. The dam under construction is to be located just below this spot and the trees in the background of the picture will later be inundated.

Office Records—Their Filing and Indexing

BY IRENE WARREN

(Records that cannot be found instantly when wanted are practically useless. Standardized, well-kept files are an invaluable asset to any business, and general principles regarding them are here discussed by the director of the Chicago School of Filing and Indexing, in the first of a series of twelve articles.—The Editor.)

THE CENTRAL FILING SYSTEM AND DEPARTMENTAL FILES

The need for standardized filing and indexing has become universal in the business world. Every firm, government office, and association has materials to be filed. Whether the filing system be that of a corporation having hundreds of drawers filled with correspondence and other filed materials, or merely the single file of the man whose place of business is only desk room in another's office, the fundamental principles of filing are the same and the availability of information in these files, when it is needed in a hurry, may mean the making or the breaking of a valuable contract.

Stewart Warner Speedometer Corporation, Filing Department. Steel cabinets for current correspondence, with 2,600 division alphabetical guides. Transferred correspondence bound in volumes and filed on steel shelving. (Globe-Wernicke equipment.)

Filing and indexing are concerned with two main types of material: one, the orderly arrangement of a collection of papers or pamphlets, the other, the systematic recording of information on cards or statistical sheets. Both are for purposes of preservation and reference.

In a large, complicated organization such as a department store, there are often more than fifty different records, most of them great in volume, such as correspondence, invoices, reports of various types—mainly papers in typewritten or handwritten form—besides all the material in printed form such as trade catalogs, government documents, pamphlets, books, pictures, lantern slides, which if of sufficient size and importance to the firm are collected into a department by themselves known as the business or commercial library.

Because of the varying nature and size of firms and the varying nature and size of the records, each one worked out, often as the emergency compelled him to do, his own system for recording and arranging information or materials, with little regard to the general study of filing and indexing. In recent years, however, certain firms and individuals have succeeded in laying down some fundamental principles for the selecting, arranging, indexing, and use of business papers and information, and have developed some very satisfactory standardized equipment,

The Federal Reserve Bank in Chicago will be in cramped quarters until their new building is completed. A large volume of records is handled in a small space in a most satisfactory manner because every inch of space has been carefully planned, furniture placed so as to economize effort, order and system worked out for every detail and a daily routine planned by which all new records are filed away each day with dispatch and accuracy. The papers, sometimes varying in size, are placed in folders with such care that they are never torn or crumpled and are always readily accessible. Note the provisions for adequate lighting and ventilation.

supplies, and devices for their care. The office manager who is not making use of these facts loses time, energy, and money for his firm.

Today, managers of any kind of organization from the temporary, loosely constructed political campaign to the permanent corporation, lay out the aim and scope of the organization and immediately plan the records necessary to carry on their project. These records are the framework, in one sense, as long and as broad, but not as deep, as they always follow the lines laid out by the organization.

The Central Filing System

In years past, these files and indexes were started in any part of the organization as a need developed without regard as to whether they were a duplication as a whole or in part of some other record, or whether they might be of any use to any department other than the one setting them up. But experience has proved this a wasteful method.

The tendency in modern business is to bring all files and indexes into one department and to place

the department in charge of a file clerk who is trained for such work and who is also a competent executive. Information is then furnished the various employes as needed by means of messenger service, house phones, or by lending materials to departments in much the same fashion that patrons borrow books from the public library.

The central filing system thus becomes a clearing house to which all papers are sent and from which all business papers are borrowed. Thus no question arises as to where any paper should go, or where to obtain information in such records, and there is less loss of both time and papers.

The file clerk in a central filing system has the opportunity to study the records as a whole, the indexes needed, to consider each part in relation to the whole, each file and index in relation to the complete service it can render to every department in the organization, and thus eliminate duplication, cut down cost in operating, and keep a unity in the method of handling the files and indexes which makes for accuracy and speed in the service rendered.

In almost every firm there are some files and indexes necessary to carrying on the work of departments and these must be kept in the respective departments. But many department heads would gladly relinquish the care of such material they are now keeping if they were sure they could get the papers or information they want when they want it. In many instances, the department does not need the correspondence or extended record it is keeping, but would be much better served if certain information were taken from such papers and placed on a well designed card which would be much more readily accessible. When duplicate records are needed, they will cost less if made at one time. The head file clerk in a central filing system with the necessary corps of workers should file away papers and make indexes for the various departments as well as for the central filing room.

An alert, competent file clerk can readily check letters to see that all points have been cared for before the letter is filed. The initials of each person attending to each point should be placed on the letter and the carbon copy of the answer pinned to the incoming letter. Because regulations covering the points just cited had not been made in one of our large city banks, three of its officials answered the inquiries of a small town banker in three different ways to their great discomfort. The central filing system which they installed to prevent the repetition of such mistakes has corrected even more inaccuracies and delays than they had counted on.

Economizing Space and Time

The filing department is set up primarily for service. Records should be well filed for historical purposes and should occupy the least space possible, for economic reasons; but by far the most important feature is to have them so arranged that they can yield the information wanted quickly and accurately. The rearrangement of information from letters and reports into statistical form on sheets and cards carefully designed for that purpose will doubtless be done more in the future as it will save the time of the consultant, economize space and give added values over the cumbersome method of consulting one paper at a time.

Records which a short time ago were tucked off in attics and basements are now being brought into the well-ventilated and well-lighted rooms which are needed to carry on the detailed work of filing

Foreign orders numerically arranged, in cap size wood cabinets. Foreign division, Montgomery Ward & Co. (Globe-Wernicke equipment.)

large quantities of papers accurately and rapidly. It is still, however, an unstandardized line of clerical work and some office managers who would not hire a typist who is not well trained, turn over to inexperienced office boys the filing of valuable records and let their high-salaried men stand around wasting good hours and energy in denouncing the inadequate filing system, when a well trained file clerk with executive ability could arrange easily enough to give them the papers they want when they want them.

Importance of Files

The efficiency expert who has investigated this problem will tell you that the modern methods of filing cost more money for equipment, individual salaries for clerks are higher, and the quarters are more expensive, but that on the whole it is cheaper because it cuts overhead expense, it gives the firm the chance to do better business, often definitely bigger business, than did the old way of letting anyone file any of the papers at any time he had nothing else to do. Filing and indexing in one sense is one phase of efficiency work.

In the central filing department there is an excellent opportunity to study in detail the policy of the firm and the various departments in it, the business that comes in and the firm's methods of handling it. For this reason some organizations are requiring the new clerical workers to spend a certain length of time in the filing department and are teaching there the principles of filing and indexing and the various records kept in the organization.

Oil Pipe Line Transmission

BY H. W. CROZIER

(The fuel situation has centered considerable added interest lately upon oil production and distribution, and in view of the especial interest which this subject has for the West, the following article is a timely contribution to current discussions. The author is associated with the engineering firm of Sanderson and Porter, San Francisco.—The Editor.)

Oil pipe-line design methods applicable to the heavy and refractory oils of California and Mexico as well as to the easily pumped oils of the Mid-continent and Eastern fields have been developed, starting from an initial effort to connect hot oil pumping performances with the well established formula for water of the hydraulic engineers. It was

Pumping station in California, handling heated oil. The relatively heavy oils of California and Mexico must be heated to permit practically any kind of pumping.

recognized if this could be accomplished there would thereby be opened to the oil engineer that vast store of hydraulic information so patiently and industriously accumulated by the hydraulic engineers during a century of effort.

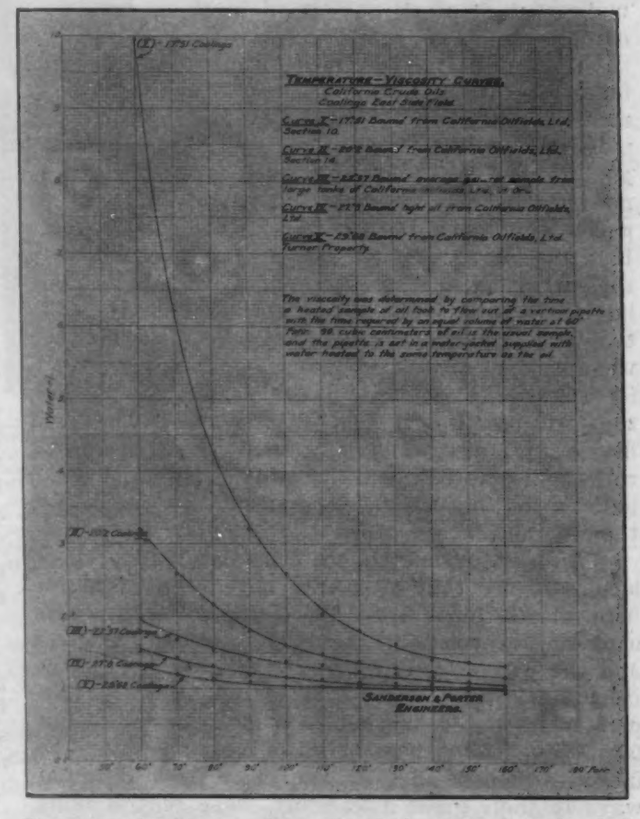
Separating the general problem so that the factors of temperature, viscosity and hydraulic flow under varying temperature and viscosities could be attacked in detail, was greatly aided by clearly defining each individual step and determining methods for the construction of temperature viscosity curves of crude oils, derivation of logarithmic temperature decrement formula, and the conception of the novel idea of the curved hydraulic gradient, so that it is now permissible at least to outline the general solution of the oil flow problem applicable to any kind of heated oil.

Constants now determined permit calculations of oil pipe lines for long distance transportation as well as for use within the refinery or at the sea-loading stations, and as accurate results can be obtained as for any other engineering structure calculation.

Hydraulic Formula

The well known Chezy formula for the flow of water is $v = c\sqrt{rs}$, or, when written in expotential form, $v = c\, r^{1/2}\, s^{1/2}$. The factor c is not constant, but varies with the slope, roughness and hydraulic radius. Kutter's formula was devised to determine the factor c. Modern hydraulic engineers have ascertained by selecting values of the exponents greater than 0.5 that the formula more nearly expresses hydraulic flow, and the value of c becomes nearly constant. Several of these expotential formulæ have been proposed, but the most useful one to the author is the Hazen and Williams formula, for which excellent tables have been published, calculated by means of a special and very valuable slide rule. The formula is written $v = c\, r^{0.63}\, s^{0.54}\, 0.001^{-0.04}$.

When fluids other than water are being considered having a viscosity other than one, it is necessary to take such factor into consideration in the hydraulic formula, introducing the square root of V, the viscosity as an additional factor. The more



Temperature-viscosity curves for a representative group of samples of oil from the Coalinga field of California.

accurate form, namely, the Hazen and Williams formula, is then written as follows:

$$v = \frac{C\ \ r^{0.63}\ \ s^{0.54}\ \ 0.001^{-0.04}}{\sqrt{V}}$$

No doubt a future more accurate determination will show the exponent for the viscosity factor is different from 0.5, but we at present content ourselves with this value until such determinations are made. It has been found that the formula in this form gives fairly accurate results when the value for C for water is taken at 138, which is the value for

smooth pipes of the diameters usually encountered in oil pipe line construction.

Table 1
PIPE LINES

Case	Line	Gravity	C/√V	V	√V	C
I.	*Monterey 6" Line	26.°	129	1.23	1.11	143
II.	*Producers 8" Line	17.°7	95	2.60	1.61	153
III.	*Producers Half Capac.	18.°3	76	2.45	1.55	120
IV.	Ora 4" Line	28.°0	97	1.60	1.26	124
V.	*Gen. Half Capac.	18.°	86	2.60	1.61	138
VI.	*Gen. Petr. 8" Line	20.°	100	1.85	1.36	136
VII.	Valley Line 8" & 10"	20.°	101	1.87	1.37	138
VIII.	Yarhola 6" Line	31.°	120	1.35	1.16	136
IX.	Yarhola 10" Line	37.°	125	1.26	1.12	140

Table 1 is based on data of various degrees of reliability and is included partly as a record of progress. The pipe lines marked with a star were operating lines of which some test data was obtainable, unfortunately incomplete in that samples were not available. The calcuations to determine the value of C were based on temperature viscosity curves of available oil samples of somewhat similar characteristics. These samples were from the same fields, but no doubt, if true samples could have been had the agreement in the value of C would be better.

Items I to VI of Table 1 were used for the purpose of originally deriving the value of the constant C. The items VII, VIII and IX are constructed lines, which were designed by use of the formulæ just described. The values of C were determined either during the acceptance tests or immediately thereafter. Their close accordance with the original value selected is remarkable.

A consideration of the methods of determining the quantity V, representing viscosity, and particularly in the general case of pipe lines where the oil, initially heated, cools rapidly as it flows along, follows.

Temperature-Viscosity Curves

The relatively heavy oils of California and Mexico must be heated to permit practically any kind of pumping and therefore, if the discharge line is of any considerable length, there is a gradual cooling of the oil due to the loss of heat by radiation and conduction, resulting in a condition wherein the viscosity gradually increases as the oil flows through the pipe. The curves shown in the illustration give a very good idea of what takes place.

On account of the difficulty in handling the viscosimeters of the standard types with varying temperatures, a glass pipette has been used, having a relatively long outlet tube and enclosed in a water jacket, in which water of the correct temperature is circulated. With this apparatus, quite accurate and concordant results are obtainable, if care is taken in the manipulation. Usually a run of the oil sample at temperatures increasing by 10° Fahr. increments, gives sufficient points to permit drawing a satisfactory and smooth curve. Water is run at 60° Fahr. for comparison. The results in seconds are corrected for gravity of the oil and the corrected seconds divided by the seconds for water, resulting in a figure called V and representing the viscosity in terms of water.

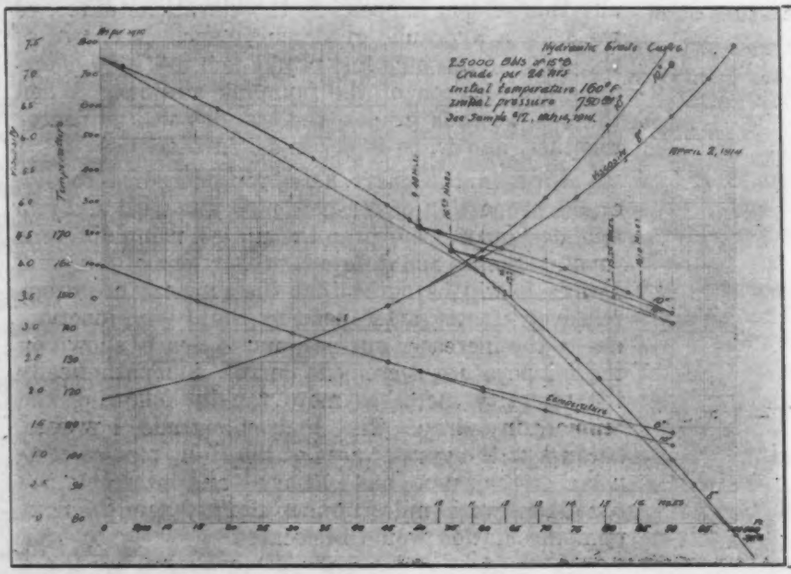
Curved Hydraulic Gradient

When considering a pipe line handling water, hydraulic engineers have been accustomed to draw a straight line, called the hydraulic grade between the source and discharge point, to represent, at any point, by its distance from the base line of zero pressure, the pressure at such point.

This line with a pipe of uniform bore is straight. In considering heated oil, a new conception, namely, a curved hydraulic grade line, is introduced, curved because the pressure does not drop proportionately to the distance but at an accelerating rate, because of the cooling of the oil as it flows away from the source.

Temperature Decrement Curve

Assuming a knowledge of the temperature-viscosity characteristics of the oil to be pumped, it will be readily seen that something must be known about the temperature at various intermediate points along a pipe line where the oil is heated initially to some temperature considerably above the earth, such as, for instance, 100° to 140° Fahr. The temperature will drop rapidly at first, near the pumping station,



Viscosity curve indicating viscosity mile by mile as oil leaves pumps, and hydraulic grade curve constructed on basis of viscosity curve, used in designing a pipe line. Two trial designs are shown, using different junction points and different proportions of 8-in. and 10-in. The temperature drops relatively faster after passing the 10-in. junction, due to the increased surface.

and less and less rapidly as the temperature difference between the oil and the earth decreases.

A curve representing such temperature relations can be drawn, which from its equation will be recognized as a logarithmic decrement curve. It is: Where

$$L = 8.8 \frac{a\ B\ W\ S}{d} \text{ Log } t$$

d = diameter of pipe in inches
B = barrels per hour
W = weight 1 barrel in pounds
L = length of pipe in feet
a = radiation constant
t = difference in temperature between earth and pipe

The equation is derived as follows:

S = specific heat of oil taken at 0.5
q = B.t.u.'s lost per hour from 1 sq. ft.

Some values for the radiation constant a, calculated from test reports of California pipe lines, are as follows:

8" line, full capac. Dec. 12-16, 1910.....26,128 bbls. daily 20°B a = 1.67
8" line, full capac. Nov. 15, 1910.....24,494 bbls. daily 17.7° a = 1.75

The total heat lost from a short section of pipe is:

$$Q = B\ W\ S\ (T'_b - T'_e) \text{ in B.t.u.'s per hour,}$$

when $T'_b - T'_e$ are the temperatures at the beginning and the end of the section under consideration.

The rate of loss $q = \frac{(T' - T)}{a}$ in B.t.u.'s per hour from each square foot where T is the earth temperature and a the radiation constant. This is a potential equation similar to the electrical equation $C = \frac{E}{R}$, but because the resistance decreases as we pass from the pipe due to increasing diameter, this equation may be of higher than the 1st power.

The heat lost at any point is:

$$d\ Q = q \frac{\pi\ d}{12}\ dl$$

where $q = \frac{(T' - T)}{a}$, T' being the temperature at dl and T the earth temperature.

The temperature lost in passing dl is:

$$dt = \frac{dQ}{BWS}$$

because—

$$\left.\begin{aligned} T'_b &= \frac{H}{BWS} \\ T'_e &= \frac{H - dQ}{BWS} \end{aligned}\right\} \text{ for distance dl.}$$

$$T'_b - T'_e = \frac{H}{BWS} - \frac{H - dQ}{BWS} = \frac{dQ}{BWS},\quad T'_b - T'_e = dt.$$

but

$$d\ Q = q \frac{\pi d\ dl}{12}$$

therefore

$$dt = \frac{q \pi d}{12}\ dl \Big/ BWS$$

transpose and substitute for q.

$$\text{then } dl. = \frac{12\ BWS}{d} \Big/ \frac{dt}{\frac{(T' - T)}{a}}$$

$$= \frac{12\ BWS\ a}{\pi d} \frac{dt}{t}$$

$$1 = \frac{12\ BWS\ a}{d} \int_b^e \frac{dt}{t}$$

$$1 = 8.8 \frac{a\ BWS}{d} \log t + c$$

Referring now to the illustration showing the set of curves used in designing a California pipe line, we have as the first step in the design the temperature decrement curve, which indicates the temperature at any point when the line is carrying its full capacity of heavy oil. Necessarily our design must start here because, having heated oil to the highest advisable temperature, we must know what temperature will be reached by the time the oil is delivered at the next pumping station and all the intermediate temperatures.

Assuming oil samples have been run and the temperature-viscosity curves determined for the various oils the line may be called on to handle, we can, knowing the temperature at any point from the temperature decrement curve, construct a curve of viscosity which indicates the viscosity mile by mile as the oil leaves the pumps. Similarly, from the hydraulic flow equation, a hydraulic grade curve is constructed on the basis of the viscosity curve so drawn. Where the hydraulic grade curve intersects the base line, obviously the next pumping station should be located, if the elevations are equal. Actually this seldom happens as the elevations differ, so we draw a hydraulic grade curve such as shown to the scale of the pipe line profile and use it to determine the location of the pumping stations. When the pipe ascends grades, the stations will be nearer together, and when it descends, further.

Now, in the chart here reproduced, a considerable proportion of ten-inch pipe was used and two trial designs are shown in the curves, using different junction points and different proportions of 8-in. and 10-in. It will be noted that the temperature drops relatively faster after passing the 10-in. junction, due to the increased surface, and is clearly shown on the temperature decrement curve. Sympathetically the viscosity increases more rapidly following the temperature drop. The hydraulic-grade, however, because of the greater area of the 10-in. pipe as compared to 8-in. pipe, has less slope and intersects the base line several miles farther along, where the next pumping station would be located.

These three curves—the temperature decrement curve, the viscosity distance curve, and the hydraulic grade curve—assembled on one sheet, show the complete design of the pipe line.

The preceding applies to heated oils flowing through pipes and gradually cooling. In some cases in California, and quite generally in the Eastern and Mid-continent fields, the oil is sufficiently limpid at ordinary temperatures to make heating unnecessary, and therefore, the hydraulic grade is calculated directly from the temperature viscosity curve, taking the viscosity at such temperature point as the engineer's judgment indicates would be the most suitable, giving due consideration to winter conditions, summer heat, etc. In such a case the hydraulic grade is a straight line and the problem is much simplified.

The New Physics

BY A. C. CREHORE

(The numerical expression of values which hav hitherto been only relative is one of the important contributions of the new system of physics presented in these articles. The author here follows out some of the mathematical aspects of the theory that the dimensions of mass are those of a velocity.—The Editor.)

In this section we shall briefly give the reasons that have led to the belief that the dimensions of mass are those of a velocity. There are two equally forceful reasons why we have come to these dimensions for mass. The first is that a new expression has been found for Planck's constant, h, which demands that the dimensions of mass shall be those of a velocity, and the second reason is that the gravitational equation, which the author has developed, makes the same demand.[1] Thus far the constant, h, has made no appearance in the preceding expressions involving the constants, m_H, m_o, e, K, c and k, and it seems required to explain what is meant by this constant.

Ratio Between Light-Frequency and Energy

When energy is radiated by a gas, the amount of the radiated energy has been shown to be proportional to the frequency of vibration at which the radiation takes place. Or again, if light of a definite fixed frequency is allowed to fall upon a fresh metallic surface in vacuo, electrons are observed to be emitted from the surface, and the energy of each electron as it comes away from the surface has been found to be strictly proportional to the frequency of the light, and to depend upon nothing else. This relation was pointed out by Einstein, who proposed the very general formula, energy is proportional to frequency, and is equal to a constant, h, times this frequency. The ratio between the energy and the frequency is this constant quantity known as Planck's constant, h. Millikan has put this formula of Einstein to an experimental test, and has obtained surprisingly good results from his machine-shop-in-vacuo apparatus. A piece of metallic sodium is so held in a vacuum tube that a knife operated by a magnetic device outside of the tube can cut a thin chip off from the metal without destroying the vacuum in so doing. Moved into another position inside of the tube, light is allowed to fall upon the surface immediately while it is fresh, which causes electrons to be ejected from the metal. The velocity at which these electrons are ejected from the metallic surface was measured by means of an opposing voltage, and these voltages are proportional to the energy of the electrons, because energy is equal to the product of electromotive force and electrical charge, and the charge on the electron being constant the energy is proportional to the electromotive force. By employing light of definite known frequencies throughout a long range of wave-lengths, and by measuring the corresponding voltage for each frequency of the light, sufficient data was obtained for plotting a good curve. If the Einstein equation represents a truth, the curve thus obtained by plotting the frequencies as abscissae and the voltages as ordinates ought to be a straight line. All the points obtained by Millikan in this experiment do lie remarkably near to the best straight line drawn by the method of least squares, and this throughout the whole of the range. This experimentally confirms the Einstein equation with considerable precision.

A New Equation

Now the slope of this line can be measured with considerable accuracy, too, the tangent of the angle representing volts divided by frequency, which is proportional to energy divided by frequency, but energy divided by frequency is Planck's constant, h. So a measurement of the tangent of the angle that this line makes gives a numerical value of h, assuming that the charge on the electron, e, is known. The best result of all of this work gave the numerical value for h, according to Millikan's statement in his book "The Electron,"

$$h = 6.56 \times 10^{-27}.$$

The new theoretical expression that the author has found for Planck's constant above referred to is

$$h = \left(\frac{a_H}{3}\right)^4 \frac{(2K)^3}{c},$$

the letters denoting the same quantities as they did above. The reason for believing that this is the correct expression for h is that both the dimensions of it and the numerical value are correct. Let us first consider the dimensions. The dimensions of a^4 are L^4, of K^3, T^{-3}, and of 1/c, $L^{-1}T$. All together they become

$$h = L^3\ T^{-2},$$

which are seen to be the dimensions of h on the space-time system according to Table I. This expression introduces no doubt as to its dimensions because neither of the quantities k nor m are involved in it, and there is no doubt as to the dimensions of a, K and c.

[1] A. C. Crehore, Physical Review, Vol. IX, No. 6, Sec. Series, June, 1917, equation (77), page 464.

According to the Einstein equation, which has been experimentally established, the constant, h, is equal to energy divided by a frequency, that is multiplied by a time. Energy has the dimensions of mv^2, mass times the square of a velocity on the common system of units, that is $L^2\ M\ T^{-2}$, and this multiplied by a time gives the dimensions of h,

$$h = L^2\ M\ T^{-1},$$

on the common system of units. This is of the nature of one of the mechanical units like force, energy, momentum, etc., in that it does not involve either k or μ. It has the exact nature of the quantity, moment of momentum, namely mva, the dimensions of which are evidently $L^2\ M\ T^{-1}$.

If it is now assumed that the dimensions of h obtained above on the space-time system are exactly the same as the dimensions just given on the common system, we must have

$$h = L^2\ T^{-2} = L^2\ M\ T^{-1},$$

whence it immediately follows that the dimensions of M must be

$$M = L\ T^{-1},\ \text{a velocity.}$$

This is one of the reasons for considering that mass has the dimensions of a velocity. But before calculating the numerical value of h, let us examine the new expression from other points of view. The 2K, which appears in the expression, is equal to the frequency of revolution of the electrons in the hydrogen atom in its normal state, which accounts for the numeric, 2, satisfactorily. The only other numeric in the expression is the 1/3rd part of the radius of the nucleus. In connection with a spherical shape the factor 1/3rd of the radius occurs in the expression for the volume of a sphere.

Determining the Value of a Constant

An expression has been given above for the radius of the nucleus in terms of the Rydberg constant and specific inductive capacity, namely

$$a_H = 8/5Kk.$$

Using this expression for a_H in the new value of h above, we obtain as an equivalent expression for h, by eliminating a_H,

$$h = 8^3/15^4 k^4 Kc.$$

The dimensions of this expression are just the same, namely, $L^2\ T^{-2}$, if we regard k as the reciprocal of a velocity. But, the numerical value of k is unity, and the constant, h, is thus made to depend numerically upon the two constants K and c alone, each of which is known with exceptional accuracy. Adopting the values as before, namely $c = 3 \times 10^{10}$, and $K = 3.290 \times 10^{15}$, we find

$$1/Kc = 1/3.290 \times 10^{25} \times 3 \times 10^{10} = 10.13171 \times 10^{-27}$$

and the numeric

$$8^3/15^4 = 32768/50625 = 0.647{,}269.$$

Multiplying these together gives h numerically as

$$h = 6.5579 \times 10^{-27}.$$

Upon comparing this value with the experimental value obtained by Millikan, as above described, namely, 6.56×10^{-27}, it is seen that the agreement is almost exact; and especially, if we should make c just a little under $3. \times 10^{10}$, which has not been done because there seems to be a difference of opinion as to the best value of the velocity of light among the different authorities, though all agree in making it under 3, we would obtain a yet closer value to 6.56. It is thus of considerable importance to make the numerical value of h depend upon only two constants that are so accurately determined as c and K. No doubt from this circumstance a more reliable value of h can be obtained than by any other method.

In examining the work of Millikan it is found that he has given some weight to the experimental value of h found by different methods by other experimenters, and has struck an average between them, finally adopting as a value that seems to fit all results the best of $h = 6.547 \times 10^{-27}$. Such a difference as that between 6.56 and 6.547 would make an easily perceptible difference in the slope of the line that Millikan found as the best result of his experiment. It is the author's opinion that there was no increase in the accuracy of the value of h obtained by abandoning the true result of his own experiment because of the influence of the other experimental results.

The expression for h may be transformed again by means of the Lorentz mass formula, namely

$$a_H = \frac{16}{5m_H k}\left(\frac{e}{c}\right)^2$$

and the Rydberg constant

$$2K = m_H\left(\frac{c}{e}\right)^2$$

into the following form, in which K is eliminated,

$$h = \left(\frac{16}{15\,k}\right)^4 \frac{e^2}{m_H c^2}.$$

This form is of interest as connecting h with e and m_H. It is to be observed that the dimensions of the denominator are zero if we regard k as the reciprocal of a velocity and mass as a velocity, for mc^2 is the fourth power of a velocity and k^4 is its reciprocal. It follows that the dimensions of h are the same as those of e^2, and this is seen to be true according to the space-time table. There is, therefore, an intimate dependence of h upon e, and the fact that e is a constant charge would indicate that h must also be constant.

New Units of Length and Time

It seems as if the importance of these new thoughts can best be emphasized if we examine the case by supposing that our units of length and of time undergo a change and remain no longer the centimeter and the second. And, especially, the importance of retaining the k in all equations is well brought out. The second of time is not a natural unit as pertaining to the atoms. It depends rather upon the rotation of the earth on its axis. A more natural unit for time would be the time of one revolution of the electrons in the hydrogen atom. And the centimeter is not a suitable length, or rather a natural one, as applied to the atoms. A natural unit of length would be the distance travelled by light during the time that the electrons in hydrogen are making one revolution. Let us for purposes of

illustration adopt these two units in place of the centimeter and the second.

The velocity of light then becomes unity instead of 3×10^{10} because light travels one unit of distance in one unit of time. Any velocity on the new system of units may then be obtained from the old units by dividing the numerical value of the old velocity by 3×10^{10}.

To convert length from one system to the other use may be made of the following:

A new unit of length $= 3 \times 10^{10}/2K = 4.559{,}25 \times 10^{-4}$ cm.
One centimeter (old) $= 2.1933 \times 10^{5}$ new units.
A new unit of time $= 1/2K = 0.151{,}975 \times 10^{-15}$ seconds.
One second (old) $= 2K = 6.58 \times 10^{15}$ new units.

To obtain the new values of other quantities, involving powers of L and T or both in the dimensional formulæ, multiply each L by $2K/3 \times 10^{10} = 2.1933 \times 10^{5}$, and each T by $2K = 6.58 \times 10^{15}$.

For example, twice the Rydberg constant becomes unity on the new system, for

$$2K = 6.58 \times 10^{15} = T^{-1}$$

on the old system becomes

$$2K = 6.58 \times 10^{15}/2K =$$

unity on the new system.

Specific inductive capacity is numerically unity on the old system, but, being the reciprocal of a velocity, the old value must be multiplied by 3×10^{10}, and this is, therefore, the value of specific inductive capacity on the new system. It is quite evident from this result that it will never do to omit to express specific inductive capacity in writing any formula.

New Unit of Mass

Since mass has the dimensions of a velocity, the new unit of mass becomes 3×10^{10} grams, and represents a volume of water filling a cube some 31.07 meters on each edge. It is thus a very large unit for mass. The mass of the hydrogen atom expressed in the new units must, therefore, be a smaller number than it was on the old system by the factor 3×10^{10}. It was formerly 1.658×10^{-24}, and on the new system becomes

$$m_H = 1.658 \times 10^{-24}/3 \times 10^{10} = 0.55267 \times 10^{-34},$$

and

$$m_0 = 0.898 \times 10^{-27}/3 \times 10^{10} = 0.29933 \times 10^{-37}.$$

The expression above given for the Rydberg constant may be written

$$2Ke^2 = m_H c^2,$$

but, now, on the new system of units, $2K = 1$, and $c = 1$, hence numerically

$$e^2 = m_H = 0.55267 \times 10^{-34},$$

but this is not a dimensionally true relation. The K and the c must be expressed. The omission of them is exactly analogous to the omission of the k in the common system of units, and this example thus emphasizes the importance of the matter. The new value of e is the square root of the above, namely

$$e = 0.743 \times 10^{-17}.$$

If we examine the equation just given for the Rydberg constant, it is seen that $2Ke^2$ has the dimensions $L^3\ T^{-3}$, and so also does $m_H c^2$ have the same dimensions, and these dimensions are those of energy, the cube of a velocity on the space-time system. Numerically, therefore, since $c=1$, and $2K=1$, this energy has the same value as the mass of the hydrogen nucleus and also of the square of the charge on one electron. If we had always used this new system of units instead of the old system, and had omitted the c and K, one might be led to believe that the mass of the nucleus is just the same as its energy content, for we may regard this energy as the internal energy content of the nucleus. We know, however, that mass is a quantity of a different kind from energy, and the use of the common system of units has never suggested that they are the same thing.

On the new system of units Planck's constant takes the very simple numerical value

$$h = \left(\frac{16}{15\,k}\right)^4,$$

and depends only upon the specific inductive capacity, because of the relation above, namely

$$h = \left(\frac{16}{15\,k}\right)^4 \frac{e^2}{m_H c^2},$$

for the second factor becomes unity because $c = 1$, and $e^2 = m_H$ numerically. Since $k = 3 \times 10^{10}$ on the new system of units, the numerical value of h becomes

$$h = \left(\frac{16}{15 \times 3 \times 10^{10}}\right)^4 = (0.355{,}55)^4 \times 10^{-40} = 1.598 \times 10^{-42}.$$

From this it appears that an accurate determination of the velocity of light alone will give a reliable value of h in the new system of units. But, to convert this over into the present C.G.S. system will also require a good value of Rydberg's constant. This is, in other words, the same result as obtained before, and makes h depend only upon K and c.

Unit of Energy

This section will be concluded with some reflections upon the unit of energy and the actual amount of energy contained in one gram of hydrogen. Energy, being the cube of a velocity, the new unit of energy is c^3 times one erg, or 27×10^{30} ergs, a very large unit.

Using the common system of units, the energy represented by $m_H c^2 = 1.658 \times 10^{-24} \times 9 \times 10^{20} = 14.922 \times 10^{-4}$ ergs. This is equivalent to 1.4922×10^{-10} joules, since one joule equals 10^7 ergs, and this again is equal to the number of watts times the number of seconds, assuming that this energy can be extracted from the nucleus at some fixed rate. The total number of nuclei in one gram of hydrogen is equal to the Avogrado constant, 6.062×10^{23}, and the total energy in one gram is then $6.062 \times 10^{23} \times 1.4922 \times 10^{-10} = 9.0457 \times 10^{13}$ joules. Let us imagine that this energy may be extracted by some means at the rate of 1000 watts, or one kilowatt continuously. The supply of energy in the one gram will then last for

$$6.062 \times 10^{23} \times 1.4922 \times 10^{-10}/10^3 = 9.0457 \times 10^{10}$$ seconds of time.

This is equivalent to about 2870. years' time. The enormous store of energy in the single gram of hydrogen is thus more forcibly impressed upon us when expressed in the familiar practical system of units.

General Lighting Safety Orders

(Among the most important legislative developments in California of recent months are the general lighting safety orders issued by the State Industrial Accident Commission. As they affect every branch of the electrical industry as well as all other industries, throughout the State, their provisions have been summarized in the following review, especially compiled for the Journal of Electricity.—The Editor.)

On December 1, 1919, the General Lighting Safety Orders, issued by the Industrial Accident Commission of California under the powers granted them by the Workmen's Compensation, Insurance and Safety Act, became effective. They are mandatory and affect all places within the State where people are employed for hire. They prescribe the minimum quantity of light, either natural or artificial, which must be supplied in all enclosures, yards or passage-ways used by employees. They place restrictions as to glare and light distribution upon the

Adequate and careful lighting for construction work, whether indoors or out of doors, has been found not only to reduce accidents but to speed up the work.

means of obtaining these required minimum quantities for described conditions, and they provide for emergency lighting where the nature of the hazard indicates that it is necessary. They have been published in convenient pamphlet form and are ready for distribution. Copies may be obtained by application to the Industrial Accident Commission.

Prevention of Accidents

The prime purpose of the orders is to safeguard the life, limb and eyesight of employees. Numerous competent investigators have found by analysis of accident statistics that improper and insufficient illumination is the cause of a surprisingly large portion of our industrial accidents. Some authorities estimate this percentage at as low as 18 per cent., others at as high as 25 per cent. Our annual industrial accidents, fatal, serious and slight, total the surprising sum of over a million and a half. On the basis of the above percentages, accidents preventable by adequate lighting approximate annually the total American casualties in the great war. Further, it has been found that dim illumination, bright light sources in the range of vision, glare from polished surfaces, sharp shadows and flickering lights result in a gradual but permanent injury to the eyesight of the workers. This less obvious result of improper lighting is even more insidious because it may be years before the individual becomes aware of the impairment of his vision which permanently reduces his effectiveness as a producer, and hence reduces his earning power to himself and his value as a producing unit to the State. Emergency lighting provisions have been included to guard against the possibility of insufficient light in passageways, stairways and exits to enable employees to avoid moving machinery, or vacate the building safely in the case of accident to the regular lighting system. Experience in New York, New Jersey, Pennsylvania and Wisconsin where similar lighting safety codes or orders have been in effect for some time, proves that these regulations do prevent accidents and conserve eyesight.

Increasing Production

As the orders require only the bare minimum of intensities and restrictions as to glare and distribution of light to protect the workers to a reasonable extent, and a much greater amount of light is necessary to insure maximum production, it is unlikely that they will work a hardship upon building owners and employers. In other states where they have been effective, they have had the incidental economic value of raising the general standard of illumination and thereby increasing production. Factory managers who have installed improved lighting are unanimous in their conviction that adequate lighting decreases spoilage and increases production. Extensive investigations made in a large number of industrials in the City of Chicago to determine the relation between lighting and production proved that good lighting increases output on an average of 15 per cent at an added cost of but 1 to 6 per cent of merely the labor cost. In one plant, a carburetor assembly department showed an average increase in production of 12 per cent with an increased cost for lighting of but .9 of 1% of the payroll.

Like other safety orders issued by the Commission, these orders place the responsibility of compliance upon the employers. It is, therefore, necessary for them to become familiar with the mandatory provisions or delegate this responsibility to some reliable source of advice. Architects, consulting engineers, lighting equipment manufacturers, distributors and contractors must thoroughly familiarize themselves with the orders if they are to be in a position to fulfill their duty to their clients and customers. Insurance companies should be interested as these orders affect their employers liability insurance, because insured plants whose lighting does not comply with the lighting provisions and restrictions may be considered to show negligence which may affect the rate of accident compensation.

The pamphlet containing the General Lighting Safety Orders is divided into two parts; first, the Orders Nos. 1500 to 1509 inclusive; and second, the Appendix. The Orders command. The Appendix recommends and explains. In the Appendix will be found much information gathered from reliable sources on the value of illumination as a means of increasing production and many helpful suggestions on how to comply with the orders. Besides containing lawful orders which must be complied with, it is a valuable manual on illumination to any plant manager.

Digest of Orders

The orders were made as brief and concise as possible. The following digest may be helpful to those who must become familiar with them:

Order 1500. Definitions

Order 1500 contains only definitions of the terms used in the remaining orders.

Order 1501. General Requirements

Whenever the natural lighting in working or traversed spaces in buildings or grounds or, in fact, any places of employment fall below twice the minimum intensities of artificial light as specified in Order 1503, artificial light shall be supplied during the time such places are used.

Order 1502. Natural Lighting

Order 1502 deals with natural light—its character and quantity. It provides that when natural light is used, twice the intensity given in Rule 1503, which covers artificial lighting requirements, must be provided. It requires that awnings, shades or diffusive or refractive window glass must be provided where the worker must face excessively bright light. For instance, if a worker is forced to face a southern exposure window, an awning, shade or some other means of diffusing or cutting off the very strong light, must be provided. This is to protect the eyes of the employed from glaring daylight, either direct sunlight or extremely bright reflected light from clouds in the sky or white buildings adjacent.

Order 1503. Artificial Light

This order specifies the quantity of artificial light which must be provided when daylight or natural light falls below twice the values specified. These intensities are given in foot-candles the unit of intensity of light, and vary with the nature of the work carried on in the different spaces. They are the absolute minimum required to insure reasonable safety from accident and injurious eye-strain, and are to be measured at the floor level in the case of roadways, passageways, stairways, elevators, etc., and in the case of working areas, where the work is actually performed. They range from a minimum of .02 foot-candles required for roadways and yard thoroughfares to a maximum of 5 foot-candles for special cases of fine work, such as watchmaking, engraving, drafting, etc. In the case of roadways, it is considered that .02 of a foot-candle is sufficient to enable the workmen to go about their usual work without danger of falling over or colliding with objects. The requirements of 5 foot-candles for particularly fine work was made primarily to prevent injurious eye-strain which would be caused by looking at fine details with insufficient illumination.

These orders also recognize the fact that certain operations can best be performed in comparative darkness or by their own light, such as certain photographic processes and certain kinds of glass working. In such cases, the minimum intensities required elsewhere do not need to be supplied but it is necessary in that case to take special precautions to properly safeguard the workman.

Order 1504. Measurements

This order provides that all measurements shall be made with a standardized photometer, certified by the Industrial Accident Commission, and that such measurements shall be made at the locations specified in the table given in 1503.

Orders 1505, 1506 and 1507

These three orders have to do with the shading of lamps for local and overhead lighting for the purpose of preventing glare which produces eye-strain and increases the accident hazard, and also affects the distribution of light on the work. They are, perhaps, the most important and yet the easiest to be complied with. Order 1506 requires that all lamps used for local lighting, when at or near the eye level, even a small 10 watt Mazda, must be shaded in such a manner that no part of the filament shall be visible to the employees. This simply means that all light sources, at or below the level of the eyes, shall be shaded.

Order 1505 specifies that all lamps suspended above the eye level less than one-quarter their distance from any position at which work is performed, or where places are traversed, must be shaded or covered up with a diffusing medium so that the intensity of the brightest one-quarter square inch of visible light source shall not exceed 75 candle-power per square inch. To put this in another way, it means that the filament of Mazda C lamps shall not be visible to the eye of the worker if it is hung lower than one-quarter of the horizontal distance between that worker's eye and the light source. More concretely still, it means that if a clear Mazda C lamp is hung 10 feet from a worker and lower than 2½ feet above his eye level, it must be shaded by a reflector or the bulb must be covered so as to diffuse the light. Bowl frosting in the case of the smaller sizes of Mazda C lamps will sufficiently diffuse the light as to comply with this provision. However, special glass diffusing caps which are now available and which have been developed for the purpose diffuse the light more thoroughly.

A new enameled frosting has been developed by lamp manufacturers for the purpose of enabling lamp users to comply with this order and also to decrease glare generally in industrial lighting. For the larger Mazda C lamps the glass diffusing caps, enclosing glass globes and enameled frosting is much preferable.

Lamps suspended at elevations greater than 20 feet above the floor are not subject to this requirement. However, in most cases the consideration of efficiency makes it advisable to use reflectors even when lights are suspended above 20 feet above the floor.

This order also points out the necessity of carefully designing the lighting installation where workers are required to work on polished surfaces such as polished metal, celluloid, varnished wood, etc., where the reflection of the light source may be sufficient to produce eye-strain.

Order 1508. Emergency Lighting

Order 1508 is one of the most important, yet perhaps the most difficult to interpret clearly. Note 1 under paragraph (a) gives the purpose of this order and reads as follows:

> "Note 1.—It is the intention of this Order to guard against accident due to the failure of the regular lighting system, by providing sufficient illumination to enable the occupants to:
> "(a) Avoid contact with moving machinery and other danger points until the regular lighting is again placed in operation.
> "(b) To vacate the building safely and expeditiously when this is necessary because of fire or other causes."

This order provides that emergency light shall be provided in all work space aisles, stairways, passageways, exits, outside landings of fire escapes and other structures used as regular emergency means of egress. These emergency lights are to provide for adequate illumination when through acci-

dent or other causes the regular lighting is extinguished. They shall not comprise more than 50 per cent of the total artificial illumination, and shall have a minimum intensity of (¼) foot-candle.

The emergency lighting system shall burn at all times when artificial light is required or when daylight falls below twice the minimum intensities specified in the table in Order 1503.

This order also contains provisions with reference to the reliability of the source of supply for the emergency lighting and restrictions as to arrangements of the wiring. Because the nature of the hazard varies so widely with the many different conditions as to number of employees and location of the work rooms it was practically impossible to specify clearly exact requirements. Consequently considerable has been left to the discretion of the Commission. Any questions arising in the minds of those who will be affected should be placed before the Commission.

Order 1509. Switching and Control Apparatus

The purpose of this order is given in the note which appears in the printed pamphlet and which reads as follows:

> "The purpose of this Order is to make it possible for the night watchman or other qualified persons to turn on enough lamps, when entering any portion of the premises at night, to enable them to safely see their way around without the need of a lantern or flashlight."

The pilot or night lights may be a part of the emergency lighting system. The switches controlling the pilot or night lights may be located or controlled from the main entrance and other easily accessible points.

Emergency lighting and pilot or night light switches must be plainly labeled for identification.

Small light measuring instruments or foot candle meters suitable for measuring the illumination required by these orders may be obtained at a nominal price from the large Mazda lamp and some of the reflector manufacturers. These foot-candle meters are compact, simple and easily read by the ordinary person with very little practice. Plant managers, architects, consulting engineers, lighting equipment distributors and contractors as well as factory inspectors will find them not only a convenient tool to be used in connection with the application of these orders, but a valuable means of checking up adequate illumination for maximum production. Hundreds of these instruments have been used throughout the country during the past few years.

Essentials of Esperanto

BY W. R. DAINGERFIELD

(The simplicity of the rules of Esperanto make its promoters confident of its practicability as a common commercial language. Following is a continuation of the grammar compiled by Judge Daingerfield, one of the foremost Esperanto authorities on the Pacific Coast. Further material will appear in future issues of the Journal of Electricity.—The Editor.)

17. La prepozicioj en Esperanto estas pli precizaj kaj logikaj ol en en naciaj lingvoj. Se la prepozicia senco estas duba, oni povas uzi la nedifinan prepozicion **je**, aŭ forigi la prepozicion, kaj en tiu ĉi okazo lasta oni montras la forigon, akuzativigante la komplementon de la forigita prepozicio. Se apudiĝas alia akuzativaĵo, tiam oni uzu la prepozicion **je**, evitante malklarsencon. Ekzemple, "Le venis en la pasinta dimanĉo, aŭ je la pasinta dimanĉo, aŭ simple, la pasintan dimanĉon."

17. Prepositions in Esperanto are more exact and logical than in national languages. When the prepositional sense is doubtful the indefinite preposition **je** may be used, or the preposition may be omitted, in which case the omission is shown by putting the complement of the omitted preposition into the accusative. If another accusative is near, use **je** to avoid confusion. Thus, "He came on Sunday last" may be "Li venis en (not **sur**, on, but **en**, in) la pasinta dimanĉo" or "je la pasinta dimanĉo" or simply "la pasintan dimanĉon."

18. La prepozicioj **al** (towards), **ĝis** (as far as, up to, until) kaj **tra** (through) montras mem almovon, kaj do ne postulas la akuzativon de direkto. Se oni derivigas adverbon por montri direkton, la adverbo prenas **-n**; jene, el la vorto **hejmo** deriviĝas la adverbo **hejmen.** La akuzativo de direkto estas kelkafoje figura; kiel, "Li disŝiris la leteron en pecetojn," "He tore the letter into small pieces."

18. The prepositions **al,** towards; **ĝis,** as far as, up to, until; and **tra,** through, indicate "direction towards," and therefore they do not require the accusative of direction. When an adverb is made, to indicate direction, it takes **-n.** Thus, from **hejmo,** a home, the adverb **hejmen** is derived. The accusative of direction is sometimes figurative; as, "Li disŝiris la leteron en pecetojn," "He tore the letter into small pieces."

19. Resume: Estas tri specoj de akuzativoj, jene: 1. Komplemento de transitiva verbo; 2. Akuzativo de direkto; 3. Akuzativo montranta forigon de **je** aŭ de alia prepozicio.

20. La sola helpverbo estas **esti** (to be). **Havi** (to have) signifigas tenon, posedon aŭ regadon, kiel en la angla, sed oni ne uzas la verbon **havi** por fari verbtempaĵojn.

21. La elparolado de la esperantaj frazoj kaj esprimoj en la antaŭirintaj dudek numeritaj alineoj estas vidigebla jene:

"Balai" estas "bah-**lah**-ee." En Esperanto ĉiu vokalo aŭ diftongo konsistigas unu apartan silabon.

19. To recapitulate: There are three kinds of accusatives, namely: 1. Object of a transitive verb; 2. Accusative of direction; 3. Accusative to show omission of **je** or of any other preposition.

20. The only auxiliary verb is **esti,** to be. **Havi,** to have, denotes possession, ownership or control, as in English, but is not used to make tenses.

21. The pronunciation of the Esperanto sentences in the preceding twenty numbered paragraphs may be indicated as follows:

"Balai" is "bah-**lah**-ee. In Esperanto every vowel or diphthong constitutes a separate syllable.

Se la **a** kaj la **i** povus kunmetiĝi tie ĉi, la rezultaĵo estus "balaj," elparolata "**bah**-ligh." La kunmetigo de anglaj literoj **-igh** estas neordinara, kiel vidigilo al la "longa" sono de **i** en "bite" (bajt, mordi), tamen ĝi estas plej konvena je nia nuna celo.

"Mi amas lin: Mee **ah**-mahss leen." Oni ne elparolu "aḥmahz" nek "ammas." La sono de **a**, kiel en **at**, ne ekzistas en Esperanto. En la angla kaj en kelkaj aliaj lingvoj la tiel nomitaj mallongaj sonoj de **a** en **at**, de **i** en **it**, kaj de **u** en **up** estas montrataj per duigado de la konsonanto, kiu sekvas la vokalon. Provonte skribe montri anglalingvajn sonojn per esperantaj literoj, ni eble devos utiligi tiun ĉi rimedon.

"Al, ahl; ĝis, jeece; tra, trah; hejmo, **hay**-mo; hejmen, **hay**-men."

"Li disŝiris la leteron en pecetojn: Lee diss-**shee**-riss lah leh-**tehr**-on en pet-**seht**-oyn."

"La birdo flugas en la ĉambron: Lah **beer**-do **floo**-gahss en lah tchambron." Ne diru "burrdo," nekonscie imitante la anglan vorton "bird."

"La hirundo flugas trans la riveron, ĉar trans la rivero estas aliaj hirundoj: Lah hee-**roon**-do **floog**-eess trahnss lah ree-**vehr**-on, tchahr trahnss lah ree-**vehr**-o **ess**-tahss ah-**lee**-igh hee-**roon**-doy." Ne diru "trahnz" nek "trannz" nek "trannss." Ne diru "**rivv**-er-o" nekonscie imitante la anglan vorton "river."

"Li venis en la pasinta dimanĉo, je la pasinta dimanĉo, la pasintan dimanĉon: Lee **veh**-neess en lah pah-**seen**-tah dee-**mahn**-tcho, yeh lah pah-**seen**-tah dee-**mahn**-tcho, lah pah-**seen**-tahn dee-**mahn**-tchon."

"Esti: **ess**-tee. Havi: **hah**-vee."

If the **a** and the **i** could combine here, the word resulting would be spelled **balaj** and pronounced "**bah**-ligh." The combination of English letters **-igh** seems unusual for the "long" sound of **i** in "bite," but for our present purpose it is the most convenient.

"Mi amas lin: Mee **ah**-mahss leen." Avoid saying "ahmahz" or "ammas." The sound of **a** in **at** does not exist in Esperanto. In English and some other languages the so-called short sounds of **a** in **at**, of **i** in **it**, and of **u** in **up** are shown by doubling the consonant after the vowel. When we try to write English sounds in Esperanto letters we may have to resort to this expedient.

"Al, ahl; ĝis, jeece; tra, trah; hejmo, hay-moh; hejmen, **hay**-men. Li disŝiris la leteron en pecotojn: Lee diss-**shee**-riss lah leh-**tehr**-on en pet-**seht**-oyn."

"La birdo flugas en la ĉambron: Lah **beer**-doh **floo**-gahss en lah tchahmbron." Do not say "burrdo" in unconscious imitation of the English word "bird."

"La hirundo flugis trans la riveron, ĉar trans la rivero estas aliaj hirundoj: Lah hee-**roon**-do **floog**-eess trahnss lah ree-**vehr**-on, tchahr trahnss lah ree-**vehr**-o **ess**-tahss ah-**lee**-igh hee-**roon**-doy." Do not say "trahnz" or "trannz" or "trannss." Do not say "**rivv**-er-o" in unconscious imitation of the English word "river."

"Li venis en la pasinta dimanĉo, je la pasinta dimanĉo, la pasintan dimanĉon: Lee **veh**-neess en lah pah-**seen**-tah dee-**mahn**-tcho, yeh lah pah-**seen**-tah dee-**mahn**-tcho, lah pah-**seen**-tahn dee-**mahn**-tchon."

"Esti: **ess**-tee. Havi: **hah**-vee."

Bonus Plan for Merchandise Sales

(The California Electrical Cooperative Campaign, in endeavoring to stimulate enthusiasm among the inside sales force, advocates a system of bonuses as described below.—The Editor.)

The Advisory Committee, conducting the California Electrical Co-operative Campaign, has been convinced for some time that the contractors and dealers of California could use with profit to themselves a bonus system whereby their sales force would be made to feel that the bussiness's success was their success and induced to put forth greater effort in the sale of electric appliances and in the service rendered by them to the public.

The committee upon investigation discovered many contractors and dealers already using bonus systems. As a result of its investigations the Advisory Committee has approved the following flat bonus system:

In the system recommended outside salesmen or solicitors are not considered, as most of them are working on bonuses. It applies entirely to the inside sales force (the men and women who work in the store) and is in addition to their regular salaries. It has been prepared with one idea in view—that you may secure the fullest co-operation from your sales force and, therefore, make the maximum amount of sales and give the best possible service. An effort is being made to have this plan put into operation January 1, 1920.

There are numerous ways of arriving at the bonus: For instance, on the gross sales, net profits, equal division among the salesmen based on the number of sales, division based on the total sales price, etc. The flat bonus was adopted by the Advisory Committee because it is a simple plan and on account of its simplicity can probably be used to better advantage, especially at the beginning than other plans more intricate.

Where more than one salesman is employed in a store it is suggested that 50 per cent of the bonus go to the salesman at once in daily, weekly or monthly settlements as the case may be and the other half go into a pool which will be divided equally between the store salesmen at given periods. It is suggested that better co-operation in store sales force can be obtained by having each salesman feel that he is interested in the sales made by each of the other salesmen as well as in his own sales and that there will be more of a tendency for everybody to boost the other fellow's sales; that is to say, that if one salesman makes an especially good record, the others will be glad of it rather than envious. The plan fixes the flat bonus for appliances as follows:

Household irons	10c	Disc stoves	20c
Tailor irons	15c	Toaster stoves	20c
Chafing dishes	20c	Hot plates	20c
Curling irons	10c	Waffle irons	20c
Grills	20c	Toasters	15c
Air heaters	20c	Vacuum cleaners	$1.00
Foot warmers	15c	Electric sewing machines	$1.00
Warming pads	10c	Washing machines	$1.50
Ovenettes	10c	Fans (under $15)	15c
Percolators	20c	Fans (over $15)	25c
Coffee urn heaters	20c	Vibrators	20c
Immersion heaters and milk warmers	10c	Sewing machine motors	25c
		Hair dryers	25c

This plan might be enlarged upon by paying higher bonuses on shopworn goods and by including many articles in stock which are not on this list.

SPARKS—Current Facts, Figures and Fancy

(Fish and hens are among the latest victims of applied science, and a certain unfortunate bull is being utilized, along with volcanoes and tides, to generate electric power. Recent statistics show that the United States holds an important place in the world's markets, but might be wealthier if smokers and aviators were prohibited.—The Editor.)

Oregon has more water power available for development than has any other State in the Union.

* * *

A new source of power has been evolved in Montana: a bull runs a treadmill which furnishes power for a milking machine in the dairy barn.

* * *

The fishing interests on the California coast are about to take a mean advantage of the fish by using airplanes to locate schools of sardines. The air-pilots will inform the skippers of the fishing boats of the whereabouts of fish schools by means of radio communication.

* * *

A London firm, finding many of its horses commandeered for war services, and the shortage of gasoline precluding the use of gasoline motor trucks, had recourse to electrically-propelled vans, of which it built up a large fleet. Current for their operation cost about 2 cents per unit.

* * *

Plans for building a canal running parallel to the Rhine River from Huningen to Strasbourg, a distance of about 80 miles, have been perfected by the French Government. The canal would be built and operated in such a manner as to permit the construction of ten hydroelectric stations with a total capacity of seven million horsepower.

* * *

In spite of their vacuous and detached expressions hens seem to like being in the limelight. It has recently been discovered by some astute agriculturist that by electrically illuminating the pens during the off-season between November and April, he obtained one dozen eggs more per fowl than were produced by those kept in unlighted pens.

* * *

Further disconcerting statistics are forthcoming from the society for the propagation of useless knowledge: five thousand matches are struck every second by smokers in the United States. It is further estimated that these same smokers cost the United States sixteen dollars a minute by carelessly throwing their cigarette stumps into hay ricks, ammunition factories, and national forests.

* * *

Plans for harnessing tidal power are definitely under way in France and are being considered in England. The French scheme is to build huge concrete reservoirs which will throw open their locks at high tide, and by a series of mill races supply motive power to huge generators. A plan to harness the tidal power of Langstone Harbour, Portsmouth, has been put forward in England, it being estimated that about 20 million tons of water flow in and out every day.

* * *

A pocket electric fan which ladies can carry to balls in their handbags is one of the latest inventions of some unromantically efficient mind. It consists of a fan and battery, and is switched on by the pressing of a button. Somehow we dare not predict much popularity for it. What joy is there for an infatuated and attentive partner in the mere pressing of a button? And how can ladies be expected to waste their time manipulating anything so distinctly un-decorative?

* * *

It seems that aerial navigation regulations are being issued to prevent contraband trade. It is directed that goods-carrying airships before leaving a country shall proceed to a fixed rendezvous and have their freights examined. Arriving over foreign soil they must land at a given depot and submit to the customary overhaul by the customs man. Personally we feel tempted to predict a glorious resurrection of romantic smuggling days, with diamond-laden planes dashing over frontiers pursued by aerial customs-house officials.

* * *

A new electric device was used for the first time at a recent ship-launching. The device consists of four electrically controlled guillotines through which the launching cables pass. At a given signal the pressure of a button causes the knives of the guillotines to fall and sever the cables. This method does away with the dangerous practice hitherto used in sidewise launchings of hacking the cables with axes, according to officials of the yard. The method insures that the vessel shall be released at both bow and stern at the same moment and strike the water with an even keel.

* * *

A recent estimate indicates that while the United States has only 6 per cent of the world's population and only 7 per cent of the land, it produces 60 per cent of the world's copper; 40 per cent of the world's lead; 50 per cent of the world's zinc; 60 per cent of the world's aluminum; 66 per cent of the world's oil; 75 per cent of the world's corn; 60 per cent of the world's cotton; 40 per cent of the world's silver; 52 per cent of the world's coal; 40 per cent of the world's iron and steel; 20 per cent of the world's gold; 85 per cent of the world's automobiles; 25 per cent of the world's wheat. It also refines 80 per cent of the world's copper and operates 40 per cent of the world's railroads.

PERSONALS

G. E. Armstrong, protection engineer for the Southern California Edison Company, has resigned to become associated with the editorial staff of the McGraw-Hill Company, publishers of Electrical World, Electrical Merchandising, and the Journal of Electricity, and will have his headquarters in San Francisco under the general direction of Robert Sibley, editor of the Journal of Electricity and Pacific Coast editor of the Electric World and Electrical Merchandising. Mr. Armstrong's rapid rise in the field of journalism has been a subject of comment in many quarters. He attended the University of California with the class of 1914. Since leaving the university he has been engaged in various engineering activities of the Southern California Edison Company and has acquired a wide experience in matters pertaining to hydroelectric generation and long distance transmission of electrical energy. His signed writings on these subjects have appeared in the columns of the Journal of Electricity and the Electrical World on many occasions during recent years as well as in the transactions of the American Institute of Electrical Engineers. The acquisition of Mr. Armstrong to the McGraw-Hill staff is in line with the ever-increasing desire to build up the Electrical Trio—Electrical World, Electrical Merchandising and Journal of Electricity—to the highest standards attainable.

E. B. Bumsted, consulting engineer of San Francisco, has returned to that city after a business trip to New York.

H. B. Schiefer, engineer of Cleveland, Ohio, has become associated with the Meese & Gottfried Company of San Francisco.

E. H. Bell has taken charge of the new office recently opened by the Electric Material Company in Los Angeles, Title Insurance Building.

T. E. Bibbins, president of the Pacific States Electric Company, has recently returned to San Francisco from a business trip in the Northwest.

Richard Chamberlain, Northwest manager for the Hurley Machine Company, headquarters Seattle, is making a visit to the factory at Chicago.

James T. Whittlesey, consulting engineer for the Universal Gas & Electric Company, is back in San Francisco after a six weeks' visit in New York City.

Wynn Meredith, Pacific Coast manager for Sanderson & Porter, has returned to San Francisco from a business trip to New York City and other points in the East.

E. N. Brown, president and general manager of the Majestic Electric Company, has returned to San Francisco after a thirty days trip through the Eastern States.

K. K. Carrick, traffic manager of the Pacific Northwest Traction Company at Everett, Washington, since 1910, has resigned to become connected with the Bank of Commerce in that city.

Roy J. Heffner, in charge of technical courses in the Extension Division, University of California, left December 24th for a visit to New York City, Washington, and other Eastern cities.

G. C. Pierce, vice-president and general manager of the Northwestern Electric Company, spent some days in San Francisco recently while on a business trip down the Pacific Coast.

M. M. O'Shaughnessy, City Engineer of San Francisco, was elected president of the San Francisco branch of the American Society of Civil Engineers at the annual meeting on December 16th.

D. C. Henny, consulting engineer of Portland, Oregon, has been appointed as the consulting engineer for the Columbia Basin project, for which the State of Oregon appropriated $100,000 for preliminary investigation.

John Ryan, local manager of the Western Electric Company, Portland, has been confined to his home with a serious case of blood poisoning in his hand, contracted from a slight cut which he got in adjusting his automobile.

A. H. Lawton of the Duplex Lighting Works of the General Electric Company, 6 West 48th Street, New York City, with headquarters at San Francisco, spent ten days in Seattle recently while making a trip through the territory.

Prof. Y. Furuya of the electrical engineering department of Kuishiu University, Japan, who is touring the United States in connection with the more extensive teaching of electrical engineering in Japan, was a recent Salt Lake City visitor.

A. G. Moler, formerly district superintendent at Virginia City, Nev., for the Truckee River General Electric Company, has been transferred to Carson, Nev., where he succeeds T. A. Kearney in charge of the lines and business of that district.

H. J. Jones has resigned as secretary of the Oregon Association of Electrical Contractors and Dealers and J. P. Mundt has been appointed in his place. Mr. Mundt has just been discharged from the regular army after ten years' service and had risen to the rank of captain.

A. M. Hunt, electrical engineer, is visiting San Francisco. In former years, he was actively associated with many power enterprises in the West. During the war period, Mr. Hunt was a member of the Naval Consulting Board, of which Thomas A. Edison was chairman.

A. L. Martin, manager of the Marshfield, Oregon, division of Mountain States Power Company, has been appointed by the County Court to meet with the court and representatives from every district of the county to lay out a road program for the coming year.

A. R. Fierce, well known for many years past as an electrical jobber in Southern California, has started the Wholesale Electric Company at 817 Mission Street, San Francisco. His announced policy will be to do strictly wholesale business, only selling to those contractors and dealers who are entitled to a wholesale price.

Tom J. Bennett, of the Rex Electric Company, San Francisco, was elected president of the Electrical Contractors and Dealers' Association of San Francisco, at the meeting of December 19th. Mr. Bennett has been a leader in contractor-dealer activities of California for a number of years and has been prominent in the San Francisco Electrical Development League. Last year he served on the conference committee of the local association. In his new office he succeeds Clyde L. Chamblin, who takes up his duties as president of the California State Association of Contractors and Dealers at the first of the year.

Wilfred Sykes, in charge of the application of electricity to ship propulsion for the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has been visiting the various important Pacific Coast ports during the past month. Mr. Sykes has had direction of the design, construction and installation of electrical machinery on the U. S. S. "Tennessee" and other battleships being built for the United States Navy. Before entering upon his present specialized field, he was for several years in charge of the application of electricity to steel mills for the Westinghouse Company. Mr. Sykes is a member of the board of managers of the American Institute of Electrical Engineers.

John H. Allison has joined the sales engineering department of the Celite Products Company, producers of Sil-O-Cel insulating products in the Pittsburgh district. Mr. Allison is a graduate of the Mechanical Engineering Department of the University of Pittsburgh and has had broad experience in the industrial field.

Douglas Brookman, who has been connected with the California State Railroad Commission for the past seven years, will enter private practice with the first of the year. For three years Mr. Brookman has been a member of the valuation committee of the National Association of Public Utility Commissions and has handled many important rate cases for the State Commission.

E. M. Cutting, formerly Pacific Coast manager of the Edison Storage Battery Company with headquarters in San Francisco, and who recently went east as manager of the Edison Company's railroad department, has severed his connection with that organization. Mr. Cutting's plans are indefinite, but include a possible return to the Pacific Coast, where his many friends look forward to seeing him again in this field.

F. S. Montgomery, for the past six years advertising manager, National Metal Molding Company, Pittsburgh, and prior to that for several years district manager in charge of the Atlanta office of the same company, tendered his resignation, to take effect December 31st, and will be associated with the Ivan B. Nordhem Company, outdoor advertising, 8 West 40th Street, New York City. Mr. Montgomery's successor has not been announced.

W. A. Hillebrand, formerly electrical engineer with the Pacific Gas & Electric Company, and recently engineer with the Ohio Brass Company of Mansfield, Ohio, has been appointed Pacific Coast engineer for the latter company, with headquarters at the San Francisco offices of the Holabird Electric Company. Mr. Hillebrand has just returned to the Pacific Coast with H. H. Hoxie, insulator sales specialist for the Holabird Electric Company.

P. J. Givnan, formerly with the Wagner Electric Company, St. Louis, and later for eleven years with the Kilbourne & Clark Manufacturing Company, makers of radio apparatus at Seattle, has started business for himself at 538 First Avenue South, Seattle. He will make a specialty of motor, dynamo and radio repairs. Givnan came to the Kilbourne & Clark plant as factory superintendent, became factory manager, superintendent, general superintendent and acting manager.

C. E. Grunsky, consulting engineer of San Francisco and well known to readers of the Journal of Electricity as the author of important articles involving valuation theory and practices, has been elected president of the Commonwealth Club of San Francisco for the coming year. The Commonwealth Club is one of the most important civic organizations in the West and has done much in service of the common good through its research committees, along engineering as well as economic lines. Mr. Grunsky is at the present time also president of the California Academy of Sciences and a director of the American Society of Civil Engineers.

Robert Sibley, editor of the Journal of Electricity, together with Mrs. Sibley, has returned from a month's visit to the East where he spent much time in meeting men of the industry in Chicago, New York, Boston, and Washington. In three of the dinners given in his honor while in the East he placed the story of the electrical West by means of diagrams, charts, and lantern slides, before editors and managers of eighteen national magazines, among them the Saturday Evening Post, the New York Tribune, Scribner's, Engineering News-Record, Electrical World, and Power. Among men prominent in the electrical industry present were: F. H. Gale, J. C. McQuiston, P. L. Thompson, D. R. Bullen, J. J Gibson, W. C. Peet, W. L. Goodwin, James H. McGraw, W. H. Onken, Jr., O. H. Caldwell, F. M. Feiker, M. H. Aylesworth, R. S. Hale, and M. S. Seelman.

R. H. Ballard, vice-president of the Southern California Edison Company, and president of the National Electric Light Association, is again planning to make one of his nation-wide tours in behalf of the great electrical gathering to be held in Pasadena, California, May 18-21, 1920. He is expected in San Francisco on Monday, Jan. 12, 1920, when a monster Electrical Development League luncheon will be held at the Palace Hotel to give him and Mr. John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company, a farewell send-off to the East. Mr. Britton goes East in behalf of the public policy meeting of the Association, and great interest is being manifested in the East awaiting the arrival of these two Western men, who are doing such splendid work in behalf of the electrical industry the nation over.

F. B. Jewett, chief engineer of the Western Electric Company, one of the most eminent telephone engineers of this country, has been making an extended visit to the West and is now in Pasadena, California, the place of his birth. Dr. Jewett during the war was Lieutenant-Colonel in the Signal Corps and has been decorated with the Distinguished Service Medal for his notable achievements in wireless telephony and in the perfection of devices for detecting hostile submarines. During his Western tour he has spoken in San Francisco, Los Angeles, Seattle, Portland, Salt Lake City, and elsewhere on "Some Wartime Developments in Electrical Communication and Allied Fields." Graduated from Throop Polytechnic Institute, Pasadena, in 1898, with the degree of B. A. in electrical engineering, he went to the University of Chicago, where he received the Ph. D. degree in 1902. From that year to 1904 he was instructor in physics and electrical engineering at Massachusetts Institute of Technology. Dr. Jewett's connection with the telephone world began in September, 1904, when he became transmission engineer for the American Telephone and Telegraph Company. In April, 1912, he became assistant chief engineer of the Western Electric Company in charge of all development and research work. He has been chief engineer since 1916.

Meeting Notices for Electrical Men

(Most important among recent activities are the meetings of the various committees of the National Electric Light Association, and the organization's plans for the future. Engineering societies in the Northwest report interesting programmes, and meetings of considerable importance have been held both in San Francisco and Los Angeles.—The Editor.)

DENVER MEETINGS OF N. E. L. A. COMMITTEES

Overhead Systems Committee

The Overhead Systems Committee held meetings in Denver, Colorado, on December first, second and third. The meetings were held in the offices of the Denver Gas and Electric Light Company, whose officers were most courteous to the committee throughout their entire stay and provided every facility for conducting the committee work in a comfortable and efficient manner.

The meeting was well attended by members from both the Western and Eastern sections of the country. Those in attendance were as follows:

Markham Cheever, Utah Power & Light Co., Salt Lake City.
R. L. Baker, H. L. Doherty & Co., New York City.
Thomas Sproule, Philadelphia Electric Co., Philadelphia, Pa.
W. T. Oviatt, Narragansett Electric Lighting Co., Providence, R. I.
W. T. Morrison, New York Edison Co., New York City.
L. M. Klauber, San Diego Consolidated Gas & Electric Co., San Diego, Cal.
R. E. Cunningham, Southern California Edison Co., Los Angeles.
W. G. Kelley, Commonwealth Edison Co., Chicago, Ill.
R. A. Hammack, Denver Gas & Electric Light Co., Denver, Colo.
H. H. Kerr, Denver Gas & Electric Co., Denver, Colo.
John B. Fisken, Washington Water Power Co., Spokane, Wash.
H. R. Wakeman, Portland Railway, Light & Power Co., Portland, Ore.
A. E. Silver, Electric Bond & Share Co., New York City.
J. E. Woodbridge, Sierra & San Francisco Power Co., San Francisco.
W. K. Vanderpoel, Public Service Electric Co., Newark, N. J.

Reports of the various sub-committees were submitted and it was found that there had been a very gratifying response to the questionnaires issued by the sub-committees. From the data in hand it was indicated that much interesting information can be collected regarding new construction and maintenance methods and devices. The greatest interest is being displayed in the question of insulator maintenance, so that more information can be collected regarding their operating performance and the necessary remedies can be worked out to eliminate the causes of insulator failures. It was felt at the meeting that a special study should be made of the causes of failures of suspension insulators and that such research should be continued until this part of the outside plant equipment can be depended upon to give continuous and satisfactory results. There were interesting discussions and developments regarding many construction and maintenance details and before the meeting adjourned a comprehensive plan had been made to develop all of these subjects for presentation in the yearly report of the committee.

A resolution was passed by the committee expressing its very sincere appreciation of the courtesies extended to it by the Denver Gas and Electric Light Company. The gentlemen who were particularly active in taking care of the Overhead Systems Committee were: Mr. R. L. Baker, Mr. T. O. Kennedy, Mr. H. H. Kerr and Mr. R. A. Hammack.

Inductive Interference Committee

The second meeting of the Inductive Interference Committee of the National Electric Light Association was held in Denver, Colorado, on December 1, 2 and 3, 1919. The meeting was well attended by members from many parts of the country, with a liberal proportion of Western representatives, owing to the geographical location.

Some of the sessions were devoted to a continuation of the attention given at the Chicago meeting in September to organizing for the work in hand, including the establishing of a centralized agency to assist power companies to effective cooperative effort and a better understanding in meeting the difficult problems of the inductive interference situation—a situation continually increasing in proportion with the rapid multiplying of power and communication circuits.

Other sessions were given to sub-committee work in analyzing and compiling information gathered pertinent to the situation, and to consideration of requests from several localities for advice in meeting specific and active inductive interference problems.

The discussions lent renewed emphasis to the committee's realization of its need for thorough support from the power companies, at this stage, by contributing information of their experience and methods of meeting the problems of this kind encountered.

The chairman of the committee is A. E. Silver of the Electric Bond and Share Company, 71 Broadway, New York City.

Electric Metermen's Association

A meeting of the Electric Metermen's Association was held at the Hotel Whitcomb, San Francisco, on December 26th at 6:30 p.m., J. E. Bridges in the chair. There were present meter department and district heads representing all the power companies in the state north of Bakersfield. The gathering was a large one, and included, in addition to the regular members, S. P. Russell and Lloyd Henley of the Railroad Commission, who comprised a committee on Safety Rules for meter installations.

Papers were presented by J. C. Abel, on "Safety Meter Installations," and A. E. Coney on "Reactive Component Measurements," and were followed by general discussion.

O. A. Knopp reported on the progress being made by the N. E. L. A. meter committee with regard to the convention to be held at Pasadena in May.

The meeting adjourned at 10:45 p.m.

BUILDERS OF THE WEST — LXVIII

JOHN CAMPBELL MERRIAM

Forces of research and investigation have long been quietly at work in the upbuilding of the West—none the less important because much of their work goes unobserved by the general public. Nobly typifying these essential forces is Dr. Merriam, Professor of Palaeontology at the University of California, where his activities have been engaged for a quarter of a century. As an authority on fossil reptiles and mammals of Western North America, and on the general historic geology of this region, he has gained worldwide recognition—particularly for his studies and discoveries of the fossil remains in the asphalt pits of Rancho La Brea, California. Dr. Merriam is president of the Geological Society of America; member of the Explorations Committee of the National Research Council, and of many learned societies. His labors have added greatly to the intellectual standing of the West. To Dr. John Campbell Merriam, scientist and educator, this issue of the Journal of Electricity is therefore affectionately dedicated.

NATIONAL ELECTRIC LIGHT ASSOCIATION

Important meetings at which the enlarged program for the future activities of the National Electric Light Association is to be discussed will be held in New York in January.

A meeting of the Public Policy Committee will be held at the headquarters in the Engineering Societies Building on January 29th. John A. Britton, chairman of the committee, will come from San Francisco to preside. President R. H. Ballard of Los Angeles will also be present. It is expected that the full membership of the committee will be present. Suggestions and advice will be requested from the committee in regard to the future activities of the Association and the new program which is now being arranged.

The Executive Committee meeting will be held on January 30th. Action will be taken on the program for future activities and an effort will be made to settle definitely the matter of the Geographic Sections. In speaking of the progress which is being made in the organization of the central stations of the country into Geographic Section affiliation with the N. E. L. A., M. H. Aylesworth, executive assistant to the president, said, "The outlook is very encouraging. The plan is receiving widespread favorable comment and many state organizations have shown a desire to aid in carrying it through."

N. E. L. A. EXECUTIVE COMMITTEE

Much business pertaining to the general affairs of the National Electric Light Association was transacted at the meeting of the Executive Committee on December 4, a report of which has just been made available. Vice-President Martin J. Insull presided.

Walter Neumuller, chairman, Membership Committee, reported that its program is under way with several campaigns well advanced. The committee expects early in the new year gratifying results from its efforts.

Frank A. Birch, chairman, Company Sections Committee, outlined the work accomplished by his committee. The committee recommends that a bureau be established at headquarters for the supervision of Company Section work. A sub-committee of the Executive Committee will study the report of Mr. Birch and report at a later meeting.

Vice-President M. R. Bump reported on the situation as to geographic sections. A letter has been sent to all member companies in the districts not already organized calling attention to the tentative division of the country and asking for suggestions and support. The committee hopes to receive many suggestions and plans to send out another general letter.

M. H. Aylesworth, executive assistant to the president, reported on the rearrangement of offices at headquarters and also on his attendance at the convention of the National Association of Railway and Utility Commissioners, in Indianapolis on October 14. He also told what was being done to relieve the shortage of coal during the strike, which was then in progress.

Mr. Aylesworth spoke also of the letter which he sent recently to the executives of Class A companies, outlining part of the program for future activities of the association and asking for suggestions as to how the work could be improved. Hundreds of answers to this letter have been received and they show careful thought. He also urged that greater interest be taken by the executives of member companies in the company section work.

Chairman Symes of the Accounting Section reported that a well attended meeting of the Executive Committee of that section was held in Detroit on October 20. The Accounting Section Committee is ready to confer at any time with the committee from the National Association of Railway and Utility Commissioners on the subject of a uniform classification of accounts.

Secretary Marshall of the Electric Vehicle Section reported on its work, as Chairman Foster was not present.

For the Technical Section, Chairman Moultrop reported that the work is going along smoothly and energetically. Four representatives from the Pacific Coast were present at a recent meeting of the Executive Committee of the Section and better cooperation between the East and the West will result.

Chairman Learned of the Commercial Section reported that following the successful series of meetings in October in Chicago, about ten or twelve meetings are planned to be held in New York on January 5, 6 and 7. This method of grouping meetings will make for efficiency and minimize traveling expenses.

The committee indorsed the movement for formation of a National Department of Public Works.

Electrical Contractors and Dealers' Association of San Francisco

An important amendment to the constitution, providing for authorized representatives of firms to attend regular meetings and vote in behalf of the firms, was passed at the meeting of December 12th. Several changes in the by-laws were also effected. Provision was made for appointment of a legislative committee, standardization committee, and supplies committee, and the duties of each outlined. A report was received from the special committee on cooperative advertising by contractors, but action was deferred.

The main business of the meeting of December 19th was the election of officers for the year 1920. Those chosen were: T. J. Bennett, president; W. R. Mobley, vice-president; Victor Lemoge and T. de Pass, members of the Conference Committee; C. F. Butte, member of Building Industries Board of Governors; T. J. Bennett and Earl Browne, members of State Executive Committee.

A. I. E. E., Seattle Section

The American Institute of Electrical Engineers, Seattle Section, held an interesting meeting and election of officers on the evening of December 16. J. Helenthal, chairman of the membership committee, reported on the work of that committee, showing the increase for the last year as well as the two years previous. G. E. Quinan, chairman of the Papers and Meetings committee, reported on the program of the section for the past year and called attention to the success of the plan adopted of having a program of the meetings of the year, which was carried as arranged with one exception. T. C. Smith, secretary and treasurer, made his report, which was accepted. The resignation of A. A. Miller as one of the counselors of the Associated Engineering Societies, was accepted. S. C. Lindsay, the other counselor, reported on the last meeting of the Associated Engineering Societies, which was also attended by the chairman of the Section, John Harisberger. The question of licensing engineers, which is to be up for consideration by the coming legislature of Washington, was an important matter of discussion. The endorsement by Pacific Coast Sections of the recommendation of the Seattle Section, of the name of Dr. Magnusson of the Seattle Section, for vice-president, was asked.

The subject of discussion for the evening was "Radio Engineering in the Thirteenth Naval District," and was presented jointly by R. H. Marriott and Dr. H. H. Lester of the Bremerton Naval Station Radio Laboratory. Dr. Lester outlined the scope of the work done by this district, explained the fundamental principles and circuits, and showed the desirability of the new trans-Pacific wireless route from Keyport to Vladivostok via St. Pauls Island on the coast of Alaska. This route is about 2700 miles long as compared to about 7,000 between San Francisco and the Philippines via Honolulu.

Mr. Marriott gave a description of a method invented by him for guiding ships into narrow crooked channels and gave a demonstration with experimental apparatus. This method consisted of passing a small alternating current through a cable laid along the desired course in the channel and determining its location by means of induction in a coil of 2000 turns of wire, arranged so as to be adjustable. The coil is turned until the maximum induction is obtained, as determined by means of head phones when it points toward the cable.

Mr. Jefferson of the Kilbourne & Clark Manufacturing Company, local makers of radio apparatus, had a one-quarter kilowatt radio set of the commercial type on exhibition and gave a demonstration, bringing out in his discussion the simplicity and ruggedness of the apparatus. In reply to the question as to what current was used in the tests which Mr. Marriott had made, he replied seven-tenths of an ampere, which was the maximum amount possible with 40 volts, the rating of the cable used.

At the election of officers which followed the paper and discussions, G. E. Quinan was elected chairman and Willis T. Batcheller secretary-treasurer.

San Francisco Electrical Development League

At the December 15th meeting of the San Francisco Electrical Development League, P. J. Hennessy of the Southern Pacific Company presented an interesting address on the "Plumb Plan" of railroad control. Mr. Hennessy discussed the salient features of House Bill 8157, containing the provisions of the "Plumb Plan," which he declared detrimental to the best interests of the people of the United States. R. Earl Fisher acted as chairman of the day.

The concluding luncheon meeting of the year was the Christmas celebration of December 22nd, in the ballroom of the Palace Hotel—the largest and most successful gathering ever held under the auspices of the League. Present as special guests of the League were fifty-seven children from the San Francisco Nursery for Homeless Children, who were delighted by the good things of the table and the many presents on the Christmas tree. F. D. Fagan, San Francisco manager of the Edison Lamp Works of the General Electric Company, was the bountiful Santa Claus of the occasion, distributing the gifts not only to the orphan children but also to the children of members, who attended in goodly numbers. E. O. Shreve, president of the League, welcomed the youthful guests and told of the plan to make the Christmas tree celebration an annual event. This festivity, he added, was made possible by a system of cheerfully-given fines imposed on the members at meetings throughout the year.

The arrangements for the luncheon and entertainment were in charge of Arthur Kempston.

American Association of Engineers

The American Association of Engineers has just organized local chapters in the following cities: Gray's Harbor, Everett, Bellingham, Seattle, Tacoma and Bremerton Navy Yard, all in the state of Washington.

Pacific Service Employees' Association

At the unique and enterprising Christmas entertainment given by the Pacific Service Employees' Association at the Scottish Rite Auditorium on December 23rd, a one-act musical comedy entitled "Love O' Lights" was the feature of the evening. The book and lyrics were by Fred S. Myrtle, and the music by Lowell Moore. The synopsis is given as follows:

Monoxide Gas, Esquire, is a roystering blade who has enjoyed considerable notoriety in the sphere inhabited by himself and his numerous retinue. In the past he has been regarded as an almost intolerable nuisance, but now he is showing signs of reformation and discarding his vices one by one. To complete his regeneration he thinks of wedlock and his ambition is to ally himself in the bonds of holy matrimony with Miss Electra, a dainty, sprightly miss who, with her equally sprightly band, spirits of light, has charmed all within her reach and has made herself so generally attractive that she has succeeded in almost putting Monoxide Gas and his crew in the shade.

How Monoxide Gas and Miss Electra come together is told in the play. Interspersed among the principal characters are beings known as Glooms, who assume various guises in their general scheme for upsetting things and standing in the way of all happiness and progress. A happy interlude is furnished by the Matrimonial Parson, whose eye for business makes him useful at the right moment. The whole closes with a chorus of cheer, in the course of which is presented a tableau with the Spirit of Service in a halo of glory, receiving homage from all. The presence of Father Christmas with seasonal offerings lends appropriate color to the final picture.

The scene is laid in a forest in Wonderland.
Time, the present.

The comedy, which was a signal success, both in conception and execution, was preceded by Christmas carols, sung by the Pacific Service chorus, and a brief Christmas address by Charles Pryde Cutten. The evening concluded with an informal dance.

Meeting of District Agents

At a meeting of the district agents of the Southern California Edison Company, held in the assembly room, Edison Building, Third and Broadway, Los Angeles, Tuesday, December 30, 1919, the program was as follows:

1. Load Dispatching in Emergencies.....W. L. Frost
2. Presenting Stock Selling Plans to Employees.....F. B. Lewisp
   A. N. Kemp
3. The Man in the Company.....A. B. Wollaber
4. Developments in Industrial Lighting.....C. M. Masson
5. Intra Company Courtesy.....W. L. Percey
6. Relation of Edison Benefit Fund to Pension Plan....W. A. Brackenridge
7. Changes in Accounting for Sales Department and Consumers Accounts.....C. P. Staal
8. Operating Observations.....A. E. Morphy
9. The Outlook.....R. H. Ballard
10. Power Development Program.....J. A. Lighthipe
11. Opportunities.....B. F. Pearson
12. The Art of Conciliation.....S. M. Kennedy

Westinghouse Meeting

Westinghouse dealers from all points in Southern California attended the big Get-Together Dinner given by the Illinois Electric Company at the Jonathan Club, Los Angeles, in honor of B. S. Manuel, manager of the Westinghouse Electric Products Company of Mansfield, Ohio.

C. B. Hall was toastmaster of the banquet and first called on Captain Howard Angus, secretary of the California Electrical Cooperative Campaign, who outlined the plans for the publicity campaign being conducted by the joint efforts of the California Cooperative Campaign and the Publicity Committee, Pacific Coast Section, N. E. L. A.

From Captain Angus it was learned that the purpose of the Campaign is to establish in every newspaper of California an electrical page or section at least once a week. To this end the various power companies have taken advertising space in the newspapers in their respective territories and in practically all parts of the State have established a definite advertising schedule showing the size and date they will run these advertisements. This information has been sent to the electrical dealers to enable them to tie in and concentrate their advertising on the same day on the same page, creating a smashing effect, which is bound to create a big demand for electrical labor saving devices throughout the year and especially during the Christmas season.

B. S. Manuel spoke most enthusiastically about the work of the California Cooperative Campaign and the results being accomplished.

He outlined the difficulties being encountered by the Eastern manufacurers in not being able to secure raw material and gave the dealers the assurance of the Eastern manufacturers' earnest efforts being lent towards further increasing their production to meet the ever increasing demands.

Mr. Manuel told in a very interesting manner the development of the Westinghouse line. Many years ago the Westinghouse started in the appliance business by manufacturing an electrical toaster stove, since which they, with a few improvements, have remained a pioneer in the electrical field, and its development has a great deal to do with the great development of the fastest growing business in the world—the electrical household appliance business.

He told of the great expansion of his company and of the new factory recently built at Mansfield, Ohio, where a

great increase in the production of appliances has been obtained and a complete line of electrical household appliances developed.

G. E. Arbogast of the F. E. Newberry Electric Company spoke briefly on the development of the household appliance business in Southern California and was very enthusiastic over the future of this business.

He said that with the coming cooperative advertising campaign he thoroughly believed the sales of appliances would show a marked increase and believed that the campaign would be a big boost in establishing the electrical dealers as the logical distributors of electrical appliances.

Power & Traction Mutual Aid Association, Utah

New officers have been elected for the Power & Traction Mutual Aid Association for the year 1920. W. M. Scott was elected president; Wm. Cocking, vice-president; A. M. Rust, treasurer; J. R. Mathews, secretary; George Partridge, auditor, and Dr. C. E. Openshaw, physician. The association provides insurance and health protection for employees of the Utah Power & Light Company and the Utah Light & Traction Company at a nominal cost on a mutual plan.

Committee for the Encouragement of Wiring Publicity

As a result of a paper read before the Commercial Committee of the Pacific Coast Section, N. E. L. A. and later discussed at the Executive Committee meeting, a committee has been appointed to secure the cooperation of all the electrical manufacturers in employing certain of their advertising space in the interest of properly wired homes, with particular emphasis on the liberal use of wall receptacles. T. E. Bibbins is chairman of the committee which consists of the following: I. W. Alexander, San Joaquin Light and Power Corporation; R. M. Alvord, General Electric Company; L. H. Newbert, Pacific Gas and Electric Company; Garnett Young, of the Garnett Young Company; K. E. Van Kuran, Westinghouse Electric and Manufacturing Company, and Robert Sibley, Journal of Electricity.

National Department of Public Works

A meeting of the State committee in charge of the campaign for disseminating information on the subject of a national department of public works, was held at the Engineers' Club, San Francisco, on December 22nd, Professor C. D. Marx of Stanford University presiding. It was resolved that more publicity was essential to the project.

Postponement of Meeting

In view of the coal crisis, the shutting down of industries and the limitation as to time of operation, etc., the 24th annual meeting of the Chicago Electrical Credit Association set to be held December 11th and 12th at Hotel LaSalle, Chicago, has been postponed to a date which will later be set by the Executive Committee. Hotel LaSalle reservations have been cancelled.

WESTERN MEETINGS

Dec. 9. A. I. E. E., N. E. L. A., Portland Sections.—O. L. Le Fever and A. D. Leach—Central Station Heating Problems.

Dec. 10. Electrical Cooperative League—Francis J. Heney—"Profiteering."

Dec. 29. American Institute of Mining and Metallurgical Engineers, Southern California Section—Winter Meeting.

HAPPENINGS IN THE INDUSTRY

REPORT OF CALIFORNIA STATE RAILROAD COMMISSION

Declaring that the regulation of public utilities as practiced by the California State Railroad Commission during times that threatened public welfare from many angles has been sustained, the Commission in a letter to Governor Wm. D. Stephens reviews its work during the year ending June 30, 1919. Referring to the settlement of the long-standing controversy between the Southern California Edison Company and the city of Los Angeles, which settlement makes it possible for the city to acquire at a reasonable price the electrical distributing system of the company, the Commission says:

"The Commission realized that there was a rapid drift toward a situation where either the city of Los Angeles must allow its electric power generated on the aqueduct to go to waste or it would duplicate the existing distributing system of Southern California Edison Company. The city already had an investment of millions of dollars in its power project and the electric energy generated on its acqueduct must be put to use. To duplicate the existing distributing system would mean a bitter competitive fight resulting in serious loss both to the city and the company. It was concluded therefore by the Commission that the intelligent procedure would be a purchase of this distributing system by the city."

The final result of conferences, that extended over a period of nine months, was agreement between the city and the company whereby the city was to acquire the distributing plant of the company for a price of $11,000,000. The whole matter was then put before the people. The agreement of purchase was ratified and the necessary bonds voted to consummate the purchase. The appreciation of the city of Los Angeles for the efforts of the Commission was expressed in a resolution adopted by the Public Service Commission and the city council.

The predicament of the state's utilities, due to the constantly changing operating conditions, according to the Commission, "was reflected principally in applications to the Commission for authority to increase rates, the petitions in every case setting up the claim that increased labor costs and higher material prices had destroyed the margin between financial soundness, with ability to function properly, and profitless operation; between efficient service to the public and service hampered by income insufficient to meet constantly increasing demands for service. These petitions for higher rates covered every class of utility—water, domestic and irrigation; gas and electric; warehouses and transportation, boat, train and auto." Of their actions on the petitions the Commissioners say:

"The Commission found it necessary to grant many increases because of the showing made by the utilities, which was carefully checked, and from investigations made by the Commission's staff. As a matter of fact, the need for increased income for the utilities to enable them to function to the highest point of efficiency was obvious. We believe that on the whole the Commission's rate decisions have been received by the public as necessary acts of fair dealing on the part of the Commission, acts, fair alike to the consumer and the utility.

"In Los Angeles interurban fares were readjusted at an increased rate with but little protest. Interurban rates across San Francisco bay were increased. Charges for warehouse service were advanced largely because of increased wages. Increases ranging from 10 to 20 per cent were granted to twenty-two electric utilities; twenty gas utilities received increases and the Commission readjusted the rates of forty-four water utilities. Most of the increases granted were in the nature of a percentage surcharge upon the existing rates, the Commission preferring to grant what it considers emergency increases rather than disturb the permanent rate structures of the utilities."

"The California public utilities, both from an operating and financial point of view, present an outlook that, we believe, reflects favorably the work of the Commission," is the statement in reference to the figures compiled by its experts for the annual report. They point out that the utilities are going forward with development and construction work to meet the growing needs of the state:

"Hydroelectric companies have started new plants which will entail an expenditure of more than $25,000,000. The construction work is being actively carried on and some plants will be in operation in 1920 and oth-

ers in 1921. While an expenditure of $25,000,000 may seem large, we are satisfied that it will not result in an over-production of hydroelectric energy. It will permit the suspension of the more costly generating of electric energy by steam plants, result in the saving of from 2,000,000 to 2,500,000 barrels of fuel oil and a material reduction in operating costs, all tending toward a development that ultimately will bring to the rate payer a maximum of service at a minimum of cost, the real aim of utility regulation.

"Gas companies in 1918 reported net operating revenues of $5,385,434.26 as compared with $4,846,210.84 in 1917, the increase amounting to $539,223.42.

"Electric companies reported for 1918 net operating revenues of $16,969,638.87 and for 1917, $16,123,663.47, the increase amounting to $845,975.40."

Distribution of the state's electric energy under the plan devised by the Railroad Commission as a means of meeting the abnormal demands for power created by the enormous industrial growth of the state, due to war's demands, was continued beyond the war period, the plan having withstood the strain placed upon it and enabled the thirty utilities which joined in the conservation-of-power scheme outlined by the Commission to meet every emergency.

"Distinctly a war measure," says the Commission, "the pooling of power and its distribution from a central source proved so efficacious that the utilities themselves, though relieved of the actual strain upon their resources produced by excessive industrial demands, determined upon its continuance, the only difference in its operation in peace times as against war times being the elimination of restrictions placed upon unnecessary industries."

The following indicates the importance to the state of the Commission's "pooling-of-power" plan:

"Power Administration, as outlined by the Commission, practically assures for the state a power situation that can be relied upon for any emergency, its usefulness having been proved by the test of war as well as the ever-recurring shortage following an abnormally dry period. With all the companies in the northern and central part of the state interconnected, as they now are, and the southern companies also interconnected, the danger of power failure in California is reduced to a minimum."

The report tells of the filing with the commission of annual reports of 819 public utilities. These reports cover the financial activities of 62 steam railroads, 34 electric railroads, 2 express companies, 25 water carriers, 75 electric companies, 27 gas companies, 13 gas and electric companies, 109 telephone companies, 3 telegraph companies, 7 telephone and telegraph companies, 306 water companies, 142 warehousemen and 14 wharfingers. Of the 819 utilities 96 were new public utilities.

RAILROAD COMMISSION AND DISPUTED BILLS

According to the annual report of the Railroad Commission now being printed, one of the busiest departments maintained by the Commission is that in which are received complaints against utilities regarding disputed bills. Its popularity is due to the fact that in November, 1915, the Commission made a ruling that no utility would be allowed to shut off gas, electricity, water, or any other service on account of a dispute over a bill, if the customer deposited with the Commission the amount of the bill and brought the matter to the attention of the Commission. From June 30, 1918, to July 1, 1919, the Commission received 347 complaints due to arguments as to the correctness of bills for service and accompanying the complaints were amounts that totaled $24,739.08. The money was held by the Commission until the complaints were thoroughly investigated and then an order was issued distributing it in accordance with the facts revealed by the independent investigation. In many cases the dispute was due to misunderstanding on the part of the customer. In others the utility was found to be at fault. In not a single instance was the award of the Commission questioned.

POWER PLANT SERVICE INTERRUPTED

The Pacific Light & Power Company were called upon to use every facility in their possession in order to maintain service on their system during the recent blizzard and intense cold spell. Records for the past forty years were broken as regards low temperature. The following hydroelectric plants were frozen up: Natches, Walla Walla River; Tygh Valley plant on the White River; Tucker Bridge and Powerdale plants at Hood River, and the gas plant at Lewiston. The temperatures ranged from 25 to 40 degrees below zero at these points. In order to maintain service at all, it became necessary to eliminate all street lights, sign lighting, and power loads. Power was obtained from the company's steam plants and from the Long Lake plant of the Washington Water Power Company. Hood River and The Dalles territory were served by power from the White Salmon plant of the Northwestern Electric Company. Coal was allowed by the Fuel Administration for the steam plants.

ELECTRIC SERVICE TO BE DELAYED

One new electric locomotive for the Milwaukee's Idaho-Montana service has reached Deer Lodge and another is reported to be in Chicago and about to start west. These may be all the new electrical equipment delivered to the Milwaukee during the present month. In any event not more than two of the passenger motors in service in Montana will be released for shipment to Washington before January 1st. Two weeks' time is required to transform a passenger locomotive for freight service and work will not be started on any of the equipment in Montana until new electric locomotives are received from the East. Afterwards the motors made available for freight service will have to be sent to Othello, Washington, to start the electric service between that point and Puget Sound. On account of the failure of manufacturers to deliver more than two electric locomotives to the Milwaukee in Montana the belief of operating officials is confirmed that electricity will not supplant steam in crossing the Cascade mountains before spring. It is probable that the change will be made about eleven months after the first date fixed by the manufacturers and long after the two other time limits had been set. It is the intention to transform passenger locomotives on duty in Montana to freight motors for service between Puget Sound and Othello so the freight trains of the road can be taken over the mountain ranges by electricity first. New electric locomotives for the passenger service will be sent to the coast later. At present the Milwaukee is using two electric locomotives on the west end in helper service, and this is likely all that can be operated here until some time after the first of the year.

SIX-CENT FARE IN EFFECT AT PUEBLO

A straight 6-cent street car fare became effective in Pueblo, Colo., recently, in accordance with an agreement between the Arkansas Valley Railway, Light and Power Company and the Pueblo City Commissioners made some weeks ago. The extra penny has been added so the company can meet the demands of their employes for a wage increase. Pueblo is one of the last cities in the country served with street car lines to adopt the 6-cent fare and the local company has held off from making the raise until the last possible moment. There has been little opposition to the increased car fare and the majority of the people of Pueblo are facing the extra penny charge with the feeling that it was the best way out of the difficulty.

CIVIL SERVICE EXAMINATIONS

The United States Civil Service Commission announces open competitive examinations for the positions of civil engineer, and mechanical and electrical engineer, for men only. Vacancies in the Philippine Service, at salaries ranging from $2,500 to $3,000 a year, depending upon the qualifications of the appointee, and in positions requiring similar qualifications, will be filled from these examinations, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

Employees in these positions will be allowed necessary expenses when absent from headquarters in the discharge of official duties.

The requirements for eligibility for appointment to these positions are as follows:

Civil Engineer.—Applicants must show that they have had at least three years of preliminary or apprenticeship engineering training or that they are graduates in engineering from a recognized technical school; and (2) that they have had at least three years of responsible experience in the design or construction of (a) irrigation works, or (b) structural steel and reinforced concrete buildings or bridges.

Mechanical and Electrical Engineer.—The duties of these positions will be the design and installation of telephone lines, hydroelectric pumping plants and Diesel engines, and other work falling under the general head of electrical engineering. Applicants must show (1) that they are graduates in engineering from a college or university of recognized standing, or that they have had not less than three years preliminary or apprenticeship training; and (2) that they have had at least two years' experience of a responsible character in the design and installation of telephone lines, hydroelectric plants, pumping plants, Diesel engines, or experience in work of a similar character.

INSURANCE OF EMPLOYES

Sierra Light & Power Company has put into effect an insurance plan for the benefit of its employes and employes of the Fresno Water Company, Midland Counties Public Service Corporation, Bakersfield and Kern Electric Railway and several other small subsidiary companies. The minimum amount of insurance is $1,000 for employes of one year's service, graduated to $1,500 for six years and more. The policy is enjoyed by more than 1,000 men and women employed by the company without personal obligation.

A MODERN INDUSTRIAL PLANT

Fairbanks, Morse & Co. will start the erection in Beloit this year of the most modern foundry in the world.

It will equal in size and output any foundry on the globe, and when completed will be 900 feet long, 550 feet wide, and will contain 495,000 square feet of floor space. The completed structure will have an ultimate capacity of 350 to 400 tons of gray iron daily.

Every modern, scientific foundry device, every improvement in the casting of gray iron will be incorporated in the Beloit plant.

Electric cranes will carry the raw materials to and from the big cupolas. Electric grab buckets will unload the moulding and core sand and coke. Electric magnets will grip the raw pig iron and remove it from the cars. Electric cranes and conveyors will carry all molten metal from the cupolas to every mould, whether for giant castings of 10,000 pounds or for tiny ones of a few ounces.

Double tiers of windows on the sides and other tiers in the slanting roof of the bays will light the plant evenly. These windows will all be controlled by electric motors, and operated by pressing a button. Other features are a complete ventilation system that will change the air in the vast structure frequently; a complete system of hot and cold shower baths for the entire force, and a modern cafeteria where the men can secure hot meals.

The cost of the plant is estimated at $1,500,000.

ELECTRICALLY PROPELLED SHIP

Contracts for electrical machinery for the propulsion of three new battleships have been awarded by the Navy Department; price for three sets $5,500,000. According to Navy officials electrical propulsion has been successful and no reason has appeared for returning to steam drive. The New Mexico which was the first electrically driven battleship, has given entire satisfaction and the Tennessee, the second to be thus equipped, will shortly be put in commission.

PUBLIC UTILITY STOCK

To secure funds to meet the cost of construction work made necessary by growth of business, the San Joaquin Light & Power Corporation on Dec. 26th asked the Railroad Commission for authority to issue 35,000 shares of its prior preferred stock. The company asks the Commission to fix the price at which the stock is to be sold. The proceeds from the stock sale are to be expended, under the direction of the Commission, for construction work not provided for under bond issues that have already been approved by the Commission.

The employes of the Southern California Edison Company having bought practically all of the block of 4,702 shares of stock set aside with the authority of the Railroad Commission for sale to company workmen and heads of departments, the Commission, on request of the company, granted the utility authority to set aside 2,500 more shares to be sold to the employes. The stock is to be sold at not less than $90 a share and subject to the agreement that has been approved by the Commission.

COMPARATIVE FIGURES SHOWING ELECTRICAL GAINS

The following tabulation of customers served by the Pacific Gas & Electric Company includes 1,621 consumers taken over from the Northern California Power Company in Chico District. The total number of consumers on the Northern California Power Company's lines at the time of acquisition aggregated between ten and eleven thousand.

STATEMENT OF CONSUMERS BY DEPARTMENTS

October 31st	Gas Dept.	Electric Dept.	Water Dept.	Steam Sales Dept.	Total
1907	118,847	52,666	5,505	.....	177,018
1908	129,044	60,164	5,744	.....	194,952
1909	136,791	68,318	6,332	.....	211,441
1910	149,440	81,050	6,673	.....	237,163
1911	163,679	97,207	7,200	63	268,149
1912	193,295	113,571	7,895	197	314,958
1913	205,479	128,871	8,325	258	342,933
1914	217,880	145,278	9,041	314	372,513
1915	227,534	163,577	9,562	365	401,038
1916	230,616	176,131	9,910	395	417,052
1917	241,031	191,449	12,520	427	445,427
1918	252,623	206,584	13,052	449	472,708
1919	266,572	226,286	13,296	424	506,578
Gain in 12 years	147,725	173,620	7,791	424	329,560

INCREASED BUSINESS FOR POWER COMPANY

The Mountain States Power Company will serve an additional 100 horsepower in motors being installed by the Cascades Contract Company at Albany, Oregon, for operating a new rock crusher. Linn County, Oregon, will purchase current from the company for a 75-horsepower electric hoist, which will replace a donkey engine in the county's gravel pit. A new prune packing plant, requiring 25 horsepower and 250 horsepower additional for the Willamette Valley Lumber Mill will also be served by the company. Twenty electric ranges were sold in a recent electric cooking campaign conducted in Albany.

TACOMA LIGHT PLANT PROSPEROUS

In ten months the city light plant of Tacoma has earned a profit of $340,890.55 over the operating expenses of the system, according to a statement filed by Commissioner Davisson in the city clerk's office. This means a little more than $1000 a day and indicates that the profits for the year will run over $400,000 by the first of the year. The receipts for October were $86,682.65 and the operating bill $28,184.68.

SAN FRANCISCO LIGHTING SYSTEM

The second day of the campaign to save the "Path of Gold" to San Francisco closed with $13,345.50 pledged in contracts. Twenty-seven thousand dollars more is needed before the period of anxiety shall have been passed.

Charles F. Gallagher, manager of the Down Town Association, said that the amount already pledged represents the largest property owners and lease-holders. Apathy still marks the sentiment of the smaller firms and tenants.

Owing to the press of time the soliciting force can make but little headway in the signing of contracts, and Mr. Gallagher said that if those who are willing to sign for the three-year period would write, telephone or call at the offices of the Down Town Association in the Phelan Building, much time could be saved.

In commenting on the possibility of losing the "Path of Gold," Chief of Police D. A. White said:

"A brilliantly illuminated street is the strongest weapon the Police Department has in suppression of a crime wave. The removal of the lights from Market Street would be a tremendous step backward from a viewpoint of civic improvement and would be hailed with delight by the criminal element. Coming, as it would, at a time when the people throng the streets during the Christmas shopping period, the dimming of the 'Path of Gold' would mean an increase in petty thievery and crimes of a greater magnitude."

Fire Chief Thomas R. Murphy said:

"The present system of lighting on Market Street is the biggest insurance against fire that the high value property owner can possibly have. By taking out the 'Path of Gold' pedestrians will throng the better illuminated districts and still alarms will be reduced. That means that the fires will have gained a greater headway before the arrival of the fire apparatus and besides a darkened street tends to slow up the apparatus in driving to a fire."

Arrangements were made to continue the lighting of the "Path of Gold" until after the holiday season, and members of the Down Town Association have signified their willingness to sacrifice their time in order to assure the continuance of the present system of lighting Market Street.

PLANS FOR AQUARIUM

Announcement is made by the Academy of Sciences, San Francisco, that the Aquarium for Golden Gate Park, provided for in the will of the late Ignatz Steinhart, is assured by the recent settlement of his estate. The entire amount of the legacy will be expended upon the construction and equipment of an aquarium building, which, it is believed, will be second to none in the world. Lewis P. Hobart has been appointed architect by the Academy board of trustees and Trygve Ronneberg engineer.

The new building, for which tentative plans have been drawn by Hobart, will be located just east of the Academy of Sciences building and across the way from the Memorial Museum.

Dr. Everman, director of the Academy of Sciences Museum, and Engineer Ronneberg will visit the aquariums at New York, Boston, Philadelphia, Washington, Detroit, and Chicago, and possibly the new one now under construction at Miami, Fla., where they will study the various technical matters of tanks, aeration, temperature control and analogous details connected with the proper construction and equipment of the Golden Gate Park aquarium.

Contracts will be let and building operations begun as soon as the plans have been definitely approved by the Park Commissioners, the Academy and the executors. This is expected to be within a few months.

TRADE NOTES

Contract Awarded —

The contract for constructing the steel wireless tower at Keyport, Wash., has been awarded to the Foundation Company, L. C. Smith Building, Seattle.

New Store —

K. H. McGuinn, formerly with the Pacific Power and Light Co. at Astoria, has opened up a retail electric store at White Salmon, Wash. He has the agency for the Western Electric Farm Power and Light plants for Klickitat and Skamania Counties.

Distributor Appointed —

The Electric Maid Store in Portland have been appointed as one of the distributors of the Duplexalite.

New Installation —

The Siletz Lumber & Logging Company of Siletz, Oregon, has closed a contract with the Portland office of the Allis-Chalmers Manufacturing Company for complete sawmill equipment, including all the motors for driving machinery, 1,000-kw. steam turbine condenser, injection pumps, etc.

The West Oregon Lumber Company have purchased a 2,000-kw. Allis-Chalmers Company steam turbine and generator, from the Spruce Division, for the mill at Linton. All electrical installation work will be done by the West Coast Engineering Company.

The Puget Sound Navy Yard has placed an order with the Allis-Chalmers Manufacturing Company for three 1,000-kw. transformers.

Western Representative —

The Roller-Smith Company, 233 Broadway, New York, announces that its California representative, the Electrical Material Company, 589 Howard Street, San Francisco, has opened a Los Angeles office in the Title Insurance Building. The Los Angeles office is in charge of E. H. Bell, who has had extensive experience in marketing electrical products.

The Electric Material Company handles the Roller-Smith lines of electrical measuring instruments, watt-hour meters and circuit breakers in California, Nevada, and parts of Oregon and Idaho.

Underwriters' Approval —

On December 12 the full line of renewable fuses manufactured by the Economy Fuse & Manufacturing Company were officially approved for general use by the Underwriters Laboratories, Incorporated. It is said that the Economy Fuse & Manufacturing Company is to this date the only fuse manufacturer using the label service of the Underwriters.

New Coast Agency Arrangements —

Mr. J. G. Pomeroy announces that he has taken the Pacific Coast agencies for the McGill Manufacturing Co., manufacturers of wire guards, etc.; Edwards & Company, manufacturers of bells, push buttons, annunciators, etc.; Rome Wire Company, and the Illinois Wire & Cable Company. The product of these companies is well known throughout the United States and Mr. Pomeroy plans actively to push their sale on the Coast. He intends to devote special attention to the 660-watt pull chain sockets which the McGill Manufacturing Company has placed on the market.

Western Offices —

E. H. Bell, formerly with the Electrical Material Company at 589 Howard Street, San Francisco, has opened offices at 616 Title Insurance Building, Los Angeles, California, and will represent the Safety Insulated Wire and Cable Company. In our issue of December 1 this item was given incorrectly, Mr. Bell's name being spelled "Bill."

Branch Offices —

The Brokaw-Eden Company, Alton, Ill., which is carrying on an extensive national campaign for the Eden electric clothes washer, has established a branch office in the Gas & Electric Building, Denver, and has made James H. Diamond the advertising manager for that locality.

The Bluebird Electric Washing Machine Company is opening up a branch office in the Lewis Building, in Portland, Oregon.

New Business —

The Electrical Supply Company has recently opened business in Manteca, California, at 106 Maple Avenue. J. C. Kerr, formerly a member of the C. C. Severin Electric Company of San Francisco, is manager. The Electric Supply Company is already doing a brisk business in Westinghouse and Edison appliances.

Agent Appointed —

The Lapp Insulator Company, Inc., of Le Roy, N. Y., announce the appointment of the Capital Electric Company, Salt Lake City, Utah, as their representative for the Salt Lake district, and the Butte Electric Supply Company, Butte, Mont., for the state of Montana.

Power Company Valuation —

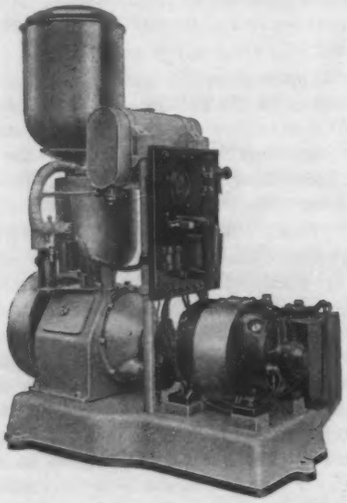
The Public Service Commission of Washington held a hearing at Chehalis, Washington, to establish the value of the North Coast Power Company's electric property in the Southwestern portion of the State. D. F. McCurrach, formerly chief engineer for the commission, made the valuation of the utility's property.

LATEST IN EVERYTHING ELECTRICAL

(With the increased use of electricity in rural districts, a light and power plant such as that described here promises to be popular on farms. A series of specially designed lighting fixtures, particularly adapted to commercial use, is another item among recent electrical devices included here.—The Editor.)

A PLANT FOR FARM LIGHTING

The Holt farm electric light and power plant, put on the market by the Automatic Light Company, Inc., of Ludington, Mich., consists of a 4-cycle valve in the head, water cooled, gasoline engine connected direct to a General Electric Company generator and a specially designed efficient electric starting device.



An automatic power-light plant, simple to operate and specially designed for use on farms.

The engine is built for heavy duty, continuous service and dependability.

The crank shaft is counter-balanced and the whole machine is of best construction and perfectly balanced throughout.

The valves are of the valve in head type. The water cooling system is very simple, specially designed for this motor and extremely efficient.

The generator is of special design. One winding gives 110 volt current direct to the power appliances or lamps, the other winding is 6 volt and is connected with the self-starting device.

When a switch is turned in the house or barn the engine is automatically cranked, and the generator started in operation, supplying 110 volt current direct.

The starting battery is protected by an automatic switch, so that in event the owner failed to replenish the gasoline supply, the self-starter would operate only 30 seconds and then cut out, preventing the useless discharge of the battery.

The plant supplies sufficient power to operate thirty 25 watt lamps or several labor-saving power devices at the same time, 110 volt power carrying three times as far as 32 volt current such as is supplied by ordinary lighting plants with storage batteries in the lighting circuit.

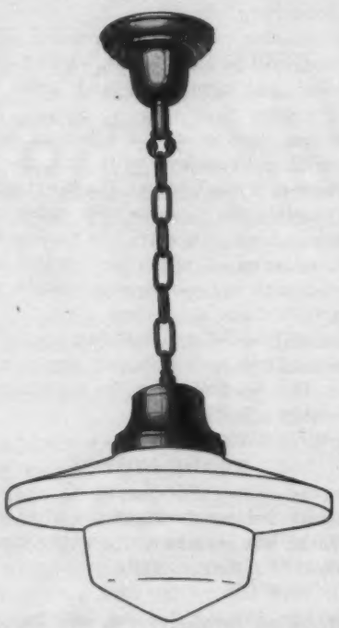
The engine is controlled by a specially designed electric governor directly connected to the carburetor. In this way the voltage is maintained constantly and the light is without flicker. When additional lamps are turned on, the governor opens the carburetor to take care of the additional load. With this automatic governor, gasoline consumption is proportionate to the load, thus making the machine very economical.

COMMERCIAL FIXTURES

A series of commercial fixtures for use with the Ivanhoe Ace, Phoenix and other recently designed glass units employed in connection with high powered lamps, is announced by The F. W. Wakefield Brass Company of Vermilion Ohio.

Wakefield commercial fixtures are made wholly of brass, and as regularly shipped, include porcelain receptacles of special patented design built into the holders. They are entirely dust-proof and do not collect flies and moths.

Being packed one unit to the carton and plainly labeled, these fixtures are particularly convenient for the jobber and dealer to handle. The package need not be opened until the fixtures are on the job, thus there can be no possible loss of parts, injury to finish or deterioration in stock.



This dust-proof fixture is made wholly of brass, and is especially adapted for use in stores, offices and public buildings.

The designs of the Wakefield commercial units, as indicated by the illustration, are such as to appeal to contractors and fixture dealers supplying equipment to the better class of stores, offices and public buildings.

MECHANICAL HANDLING OF CARGOES

A well-prepared booklet under the above title has recently been sent out by the Wellman-Seaver-Morgan Company of Cleveland, Ohio, describing the dock cranes installed at the United States Army Supply Base, Boston. Features of the booklet are the very fine photographs with which it is illustrated.

Books and Bulletins

Ground Water Hydrology

Facts in regard to the water resources of the vicinity of San Diego, with a large amount of detailed data, are presented in a comprehensive water-supply paper entitled "Ground-water Resources of the Western Slope of San Diego County, Calif.," just published by the United States Geological Survey, Department of the Interior, as Water-Supply Paper 446. This paper, which contains large maps and numerous other illustrations, is the result of an investigation of the geology and water resources of the region made by the Geological Survey with financial assistance by the State of California and the city of San Diego. The investigation was made by Arthur J. Ellis and Charles H. Lee. Mr. Ellis is a geologist on the staff of the Geological Survey. Captain Lee, who has just returned from France, where he served in the water-supply section of the First Army of the American Expeditionary Forces throughout the St. Mihiel and Argonne offensives, is a California engineer of wide experience with ground-water problems in the West.

The portion of this report prepared by Charles H. Lee treats of the ground-water hydrology of the shallow water bearing formations of the Pacific Slope of San Diego County, California, and the utilization of ground water from these formations. Complete precipitation records at 106 stations are presented, together with a detailed map of the county, with lines of equal precipitation at 2-inch intervals. Interesting conclusions are drawn regarding the amount of rainfall in any season necessary to produce runoff and also the relation of rainfall to runoff. Evaporation observations are given and comparison made between evaporation from a pan floating on a large reservoir surface, and the reservoir surface itself, which indicate that there is little difference between the two.

Detailed physical descriptions are made of the ten largest underground reservoirs of the region lying in the principal river valleys, with numerous well logs, geologic sections, records of well fluctuation, ground water profiles, and estimates of average and safe yield based on the "water table" method. The tests of the yield of individual wells are also presented. The conclusion is drawn that ground water in the San Diego County river valleys has very little movement and seldom occurs as underground streams, but occupies underground reservoirs.

Similar data is also presented for underground reservoirs of the minor coastal plain and highland valleys, the sea terraces adjacent to San Diego Bay, and the decomposed granite areas of the highland.

Tests of existing pumping plants of various types are presented, which for working conditions on the farm, show pump and pumping plant efficiency and cost of pumping for irrigation. The selection and installation of pumping machinery is also discussed.

A copy of this paper can be obtained free of charge by writing to the Director, U. S. Geological Survey, Washington, D. C. The complete records of stream flows in the region are published in the Survey's Water-Supply Paper 447.

Inductive Interference

In the course of its investigation, the Committee on Inductive Interference of the California Railroad Commission compiled a large number of technical reports on many phases of the subject. These reports were rendered to the California Railroad Commission and are on file in its archives. Owing to the widespread interest among electro-technical and other engineers, the commission was asked to publish all or the most important of these reports and thus make them available for general distribution. This the commission has done and there is now just off the press and ready for distribution to subscribers and purchasers a large volume under the title of: "Inductive Interference Between Electric Power and Communication Circuits, Selected Technical Reports with Preliminary and final Reports of the Joint Committee on Inductive Interference, and Commission's General Order for Prevention or Mitigation of Such Interference."

This publication is of special interest to electrical engineers in all branches of engineering, particularly railway, power, telephone and telegraph companies, manufacturers of electrical apparatus, and to State and Federal regulatory bodies.

The volume, bound in morocco leather and including 1,060 pages, consists of the thirty most important technical reports of the Joint Committee on Inductive Interference, selected from the seventy-one which were issued from time to time during the investigation. It also includes the preliminary and final reports of the committee to the commission, and the General Order No. 52 of the commission prescribing rules and principles governing the construction and operation of power and communication lines for prevention and mitigation of inductive interference.

The book represents the results of extensive field and laboratory tests and investigations carried on for a period of over five years by a staff of electrical engineers from all parts of the United States, at an expense in excess of $100,000, and represents the thought and study of some of the most prominent power and communication engineers of the country.

The work of the committee, the results of which are set forth in the volume, covered the field and laboratory tests of actual inductive interference, together with theoretical studies, between existing power and communication lines, transformer connection, loading, etc. Analyses were made of causes of inductive interference, magnitude, qualitative and quantitive effects under varying conditions, methods of prevention and mitigation of interference and special characteristics of the phenomena.

The book sets forth the extent and conditions of tests made. the results determined and the conclusions reached. The final report to the commission gives in summary form the results and recommendations relative to this most important subject of inductive interference, which is becoming of more vital importance to the electrical industry with the rapid development and extension of power and electric communication service.

Business Books for New Year Gifts

So wide-spread has become the interest among the business-reading public in business literature that the A. W. Shaw Company, publishers of Shaw Standard Business Boobs, will this year conduct a New Year business book campaign.

There are business books that will meet practically all requirements. During recent years business book sales have rapidly increased. This latest development to organize the business for the holiday trade gives the business-reading public an opportunity to give and secure as gifts books of usable, money-making ideas.

Safety Switches

Bulletin No. 3 on "Externally Operated Safety Switches" has just been issued by the Trumbull Electric Manufacturing Company. For the convenience of the user this bulletin has been reduced to pocket size, representing an exact duplication of such pages in the large Trumbull catalogue as are devoted to "Circle T Safety Switches." It includes many new additions to previous lists.

NEW ELECTRICAL DEVELOPMENTS

(A considerable number of city improvements are under way in the Northwest, including plans for municipal power plants. In the Pacific Central district large sums in bonds are being voted for irrigation projects, while lighting systems are receiving considerable attention both in the Pacific Southwest and the Inter-Mountain district.—The Editor.)

THE PACIFIC NORTHWEST

REEDSPORT, ORE.—The Reedsport Light & Power Company has increased the capital stock to $25,000.

WINLOCK, WASH.—C. F. Cunningham has sold his interest in the Winlock Electric Supply Company.

SEATTLE, WASH.—The Superintendent of Public Utilities has been instructed by the city council to submit at once a recommendation for subways, elevated street railways and terminals in the business district.

SEATTLE, WASH.—Regents of the University of Washington have authorized the building of a conduit to connect the university buildings with the power house and the purchase of a 500-horsepower 2,200-volt generator and exciter.

SEATTLE, WASH.—The matter of double tracking about 1½ miles of the Alki-line of the municipal street railway system is being considered. Funds to make this improvement will be available from the proceeds of the sale of $790,000 street railway improvement bonds.

OLYMPIA, WASH.—Sale of Seattle utility bonds aggregating $2,040,000, of which $1,250,000 is intended for development of the Skagit River power site. The face of the bonds fixed the interest rate at 5 per cent and they were sold at 92 cents on the dollar to Carstens & Earles and John E. Price & Co.

OLYMPIA, WASH.—Plans for the Snake River irrigation project, for which complete preliminary survey has been made by the State Reclamation Service during the past summer, call for irrigation of 60,000 acres in Franklin County, and 40,000 acres in Walla Walla County, by means of large pumps to be operated with power generated from the dam.

SEATTLE, WASH.—Mayor C. B. Fitzgerald, while in Washington, D. C., recently telegraphed his secretary that not only would the final permit for the city's Skagit River hydroelectric plant be forthcoming immediately, but that A. P. Davis, the chief engineer of the National Reclamation Service, had consented to come to Seattle to inspect the project and advise on the details of the enterprise.

TACOMA, WASH.—The Tacoma Railway & Power Company has given notice of an increase in street car fares to 10 cents beginning January 18. The new rate was filed with the State Public Service Commission together with a statement as to its necessity. It was declared that the present fare, 7 cents, does not bring in sufficient revenue to meet operating expenses and the condition of the system was pictured as being in a bad state.

SEATTLE, WASH.—Sealed proposals will be received at the office of the General Purchasing Agent for the Alaskan Engineering Commission, room 422, Bell Street Terminal, up to January 5, 1920, for furnishing free of all charges delivered on pier Mazda lamps, 500-50 watt; 200 lamps, 75 watt; 300 lamps, 100 watt; 100 lamps, 200 watt; conduletes, conduiet covers, porcelain, ten transformers, bell-ringing, Western Electric Company's No. 1; 10 pieces I-beam, 15 inches deep, 6 inches wide, three-fourths inch web.

ROSEBURG, ORE.—A crew of men under the direction of Floyd Frear, city engineer, left for Rock Creek to make preliminary surveys for the proposed municipal power plant, the erection of which will be decided by the voters of the city early this year. At the council meeting the city officials having the work in hand were ordered to speed up their departments in order to make the municipal power and water plant the first item of business on the year's calendar. An ordinance authorizing the charter amendment is being drafted and as soon as the engineer can obtain accurate estimates a special election will be called.

SEATTLE, WASH.—In competition with firms throughout the United States, the Foundation Company of Portland and Seattle was awarded the contract for constructing the mammoth Keyport station on its bid of $42,368. Keyport is located nineteen miles north of Bremerton and the station will be 400 feet in height. The contract was awarded by the United States Bureau of Yards and Docks, Washington, D. C. According to announcement the Foundation Company, of which Bayley Hipkins is vice-president, will begin work at once on the Keyport station, and will complete it within 180 days. The structure will be of steel construction, ninety feet in diameter at its base and five feet at the apex of the 400-foot tower. The contract also calls for the wiring of the station, but the government radio experts will install the radio apparatus.

THE PACIFIC CENTRAL DISTRICT

MADERA, CAL.—The election for the formation of the Madera County Irrigation district has been called by the Board of Superivsors for January 2.

SAN FRANCISCO, CAL.—Architect Charles E. Perry, Jr., 1209 Sutter Street, Vallejo, has completed plans for a water supply and storage system for the Solano County Hospital.

STOCKTON, CAL.—Recent heavy rains have enabled the Western States Gas & Electric Company to shut down its steam plant and the company is now operating exclusively on hydro power.

CHICO, CAL.—Sealed bids will be received by the board of directors of the Paradise Irrigation district up till January 15, for the purchase of bonds of the district in the amount of $140,000.

HANFORD, CAL.—A petition for the creation of an irrigation district to be known as Burrell Irrigation District has been filed with the Irrigation Board of the State of California.

MERCED, CAL.—Louis Titus, the San Francisco capitalist who purchased the Bloss ranch, contemplates the installation of four wells for irrigation, each to be equipped with a fifty horsepower electric motor.

SALINAS, CAL.—The Union Water Company, a new cooperative irrigation concern at Greenfield, has filed articles of incorporation in County Clerk Joy's office. The directors are Ernest Thayer, George B. Curtis, T. L. Rogers, George D. Hawley and Joseph Throp.

SAN FRANCISCO, CAL.—The Board of Supervisors adopted a resolution directing the clerk to advertise that sealed bids will be received by the board on January 5 for the purchase of $29,220,000 water bonds of the city, issue of 1910. J. S. Dunnigan, clerk.

WILLOWS, CAL.—T. W. Harian, local ranchman and contractor, and Thomas Sayer have been awarded the contract for building the main canal and laterals of the new Mallon and Blevins irrigation project, which will water 10,000 acres of land in the vicinity of Williams, Colusa County.

MARTINEZ, CAL.—By a vote of 173 to 14 the Byron-Bethany Irrigation District organization election was carried. As a result of the election steps will be taken in the near future toward the construction of an irrigation system. A huge reservoir is to be constructed in the vicinity of Byron at a cost of $20,000.

VALLEJO, CAL.—Orders have been received at the Navy Yard to proceed with the erection of a high-power radio station to be an auxiliary to the low-power station at Mare Island. The Pittsburgh Steel Company has the contract to supply and erect the poles. The entire cost of the station will approximate $200,000.

YREKA, CAL.—The Board of Supervisors has granted a petition to form the Shasta Irrigation District, signed by eighty-four landowners, the district embracing 10,000 acres. The petitioners now will take the matter up with State authorities for approval before calling an election to vote bonds of $600,000.

WILLOWS, CAL.—Incorporation papers of the Butte-Glenn Mutual Water Company were filed with the Secretary of State. The capital stock is $28,000 and the directors are John Houk, of Santa Maria, and Ben E. Crouch and Ferdinand Cavassa, both of Chico. The proposed irrigation district includes lands in Glenn and Butte counties.

MACDOEL, CAL.—Macdoel realty business is looking up since irrigation of this part of Butte Valley seems to be assured, numerous transfers of both town and county property have been made and three deals for desirable business locations in town are being negotiated. It is planned to erect business houses, including a hardware and general merchandise store, barber shop and a poolroom.

STOCKTON, CAL.—Samuel Kahn, vice-president and general manager of the Western States Gas and Electric Company, presented a bid for the lighting of streets in the city for five years beginning January 9, 1920, at the council meeting. The bid was accepted and a resolution will be introduced to make the award. The contract will be executed within the time specified by law.

TRANQUILLITY, CAL.—At a special election held here bonds in the sum of $260,000 for irrigation improvements carried, the vote being 83 for to 2 against. The money will be used for the construction of a new pumping plant, for the building of a canal, and for the construction of a water works plant for the city of Tranquillity. As soon as the legal matters can be attended to, work on the improvement will be started.

MODESTO, CAL.—Modesto voted $289,000 in bonds for municipal improvements. The total issue asked was $410,000. The bonds voted included street intersections, storm sewers, sanitary sewers, liquifying sewage tanks and water tanks. The items defeated were aviation grounds and fair grounds, Dry Creek Park, motorized street flushing equipment, city hall site and electrolier system to replace gas street lights. Less than 30 per cent of the vote was cast.

MANTECA, CAL.—The Manteca Board of Trustees passed a resolution instructing the city attorney and the city engineer to prepare data for the purpose of a bond issue soon to be made for public improvements in the city.

A lighting system for Yosemite Avenue and two blocks of the Hogan Road, a storm sewerage system and the widening of Yosemite Avenue are three of the propositions to be covered by this bond issue.

FRESNO, CAL.—An ambitious scheme for the agricultural development of a 27,000 acre tract on the West Side was unfolded to the County Board of Supervisors with the presentation of a petition for the formation of the James Irrigation District. The engineering plans for consummation of the irrigation project call for the development of two separate water supplies, the underground through the drilling and electrification of artesian wells and the use of the flood waters of the San Joaquin River as a secondary supply.

CHICO, CAL.—The enlargement of the Nevis dam of the Great Western Power Company, Lake Alamanor reservoir, Plumas County, which supplies the Western Canal Company with water, is contemplated as the result of demands for water made by Sacramento Valley farmers and rice growers. This is according to H. F. Cauthard, manager of the canal company, who states that the present demand for irrigation water will bring a widening of the canal lines of the company and raising of the Big Meadows dam.

FRESNO, CAL.—In order to use some of the natural gas, now going to waste in the newly discovered gas field in the Elk Hill oil territory of Kern County, for the generation of electricity to aid in coping with the power shortage existing throughout the San Joaquin Valley, A. G. Wishon, general manager of the San Joaquin Light & Power Corporation, announced the immediate expenditure of $1,000,000 for the construction of an addition to its natural gas and oil burning steam plant in Bakersfield that will double the size of the present huge plant and double its electric output.

SONORA, CAL.—The committee appointed several months ago by the Sonora Farm Center to visit the San Francisco headquarters of the Sierra and San Francisco Power Company in order to come to some arrangement whereby the farmers in this county will have more adequate water supply, have returned much pleased with the outlook. They were given to understand that the proposed lease to the Pacific Gas & Electric Company would enlarge the facilities and equipment of the P. G. & E. and put it in a condition to make extensions and other improvements in addition.

MODESTO, CAL.—Petitions calling for a special election to vote $2,000,000 in bonds for construction of the Don Pedro reservoir, a district power plant, distribution lines and for drainage purposes the form of which was presented to the directors of the Modesto Irrigation District by Attorney J. M. Walthall in adjourned session, were ordered printed under Walthall's supervision and placed in circulation at once. Attorney Walthall will supervise printing of the petitions which will be placed in circulation among the electors of the district for signatures and then presented to the board, which will set a date for the election.

SAN FRANCISCO, CAL.—J. R. Mason & Co., local specialists in irrigation and reclamation district bonds, were the successful bidders for $50,000 Terra Bella Irrigation District 6s on their bid of a premium of $940. Aronson & Co., Los Angeles, submitted the second best offer for these bonds of $814 premium. The Terra Bella District has made remarkable progress and growth during the past twelve months. These bonds were sold by the district to finance the cost of extensions to the irrigation system in order to meet the demand for water from land which had heretofore been dry farmed. Mason & Co. expect to have these bonds ready to offer during the next few days at prices to yield full 5½ per cent interest, Federal income tax exempt.

SACRAMENTO, CAL. — Unable to reach a unanimous decision as to handling the $1,800,000 Sacramento River filtration bond issue, the Sacramento Clearing House took no action at all. This is according to Secretary A. B. Carter of the Clearing House Association. Commissioner of Finance Gus S. Turner, to whom the City Commission referred the whole matter of floating the bond issue, appeared before the Clearing House asking to take the bond issue. It is understood a majority of the members favored a proposition of buying $150,000 of the bonds at par January 1st, and taking an option for the purchase of the balance on July 1st. This was defeated, however, because unanimous action is required, and W. W. Bassett, cashier of the Capital National Bank, objected, saying the proposition was no different from that his bank had offered the city.

THE PACIFIC SOUTHWEST

ORANGE, CAL.—A contract for the construction of an ornamental lighting system at Orange has been awarded to Joseph Pieb. The contract price is $18,000.

PRESCOTT, ARIZ.—The State Miner at Wickenburg reports that flood waters tore out reservoir, washed away engine house, tank and machinery at the F. X. O'Brien ranch.

COACHELLA, CAL.—Louis B. Ferrill, of Pomona, has been awarded the contract for building a spreading dam in the Whitewater River wash near Palm Springs Station, at a price of $15,865.60.

LOS ANGELES, CAL.—The San Pedro Home Telephone & Telegraph Company, the Santa Ana Home Telephone & Telegraph Company, and the Ventura Home Telephone & Telegraph Company have decreed dissolution.

PASADENA, CAL.—A resolution has been passed providing for the construction of 49 reinforced concrete lighting posts to be furnished and installed along Euclid Avenue, from the south line of Walnut to Center Street, etc.

IMPERIAL, CAL.—Building of the Thistle Canal has been authorized by the directors of Water Company No. 8. Specifications for construction will be prepared at once. The canal is to be about 15 ft. wide at the bottom. It will leave the Tamarack ranch about 5 miles north of Imperial.

LOS BANOS, CAL.—The bond election held in Los Banos for the purpose of voting bonds for purchasing and improving the city water works carried. The bonded indebtedness incurred will amount to $103,000. The plant will be moved to a new location and among other numerous improvements will have a filter installation.

PHOENIX, ARIZ.—Construction work on the main canal of the Lyman dam near St. Johns will be resumed in the near future and bids for the continued construction of the dam will be called within the next week or ten days. Six contractors, all of St. Johns, entered bids for the construction of the main canal and for the cleaning thereof. Announcement of the award will be made later.

LOS ANGELES, CAL.—Two additional tracks between Anderson Street and Echandia Junction will be constructed by the Pacific Electric Company, to facilitate handling of passengers to and from Pasadena, Sierra Madre, Monrovia, etc., as announced by V. P. Titcomb. This is the first link in a general plan for better terminal facilities at 6th and Main Streets. The new viaduct will extend from the station to Aliso Street.

SAN DIEGO, CAL.—New plans announced by the Navy Department for San Diego cover an expenditure of approximately $27,000,000, and include among other things a Naval Training Station, completion of the Marine base now under way, conversion of the shipbuilding plant into a Navy repair yard, a base for destroyers, Naval aviation and Naval hospital. Several million dollars of the amount appropriated will be be expended in 1920.

THE INTER-MOUNTAIN DISTRICT

RIGBY, IDA.—This city has just granted the Utah Power & Light Company a fifty-year franchise for power and light service.

SHELLEY, IDA.—This city will soon receive electric service from the Ashton-St. Anthony Power Company, according to announcement made by the management of that company.

DUBOIS, IDA.—This city will shortly receive electric service from the Ashton-St. Anthony Power Company. The company promised to have service available December 24, for the proper observance of Christmas Eve.

YERINGTON, NEV.—A decree confirming the bond issue and all proceedings for the organization of the Walker River Irrigation District has been entered by Judge T. C. Hart here. The bond issue providing for the construction of a storage reservoir and irrigation ditches is for over $900,000.

IDAHO FALLS, IDA.—City officials have appealed to the Utah Power & Light Company for additional power to take care of the city's requirements. The city municipal plant is having some difficulty giving service on account of the extremely cold weather with consequent trouble with ice and low water.

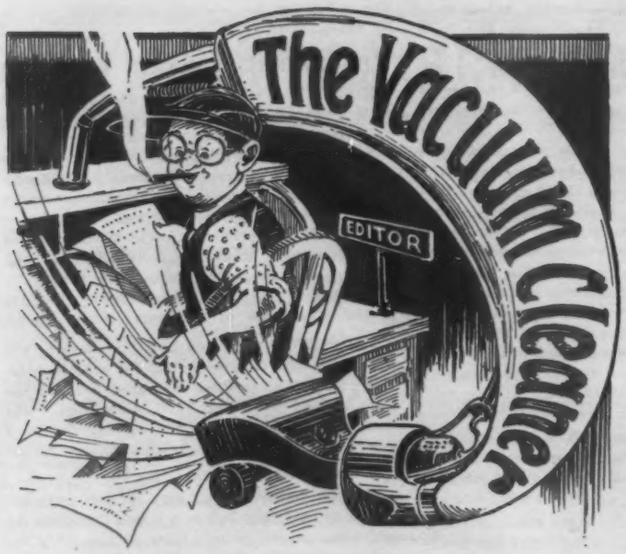
PROVO, UTAH.—The Utah Valley Gas & Coke Company is permitted, under an order of the Public Utilities Commission of Utah recently filed, to increase its rates for gas service to customers in Provo, Springville and Spanish Fork. The order grants even a larger increase than asked for by the company. The new schedule becomes effective December 20, 1919.

OGDEN, UTAH.—Application for the water power in the Targhee forest, near Idaho Falls, Idaho, was made at the District Forest Engineer's office in this city recently by N. P. Bean. About 3,000 horsepower is involved and the applicant intends running a transmission line from the power site along the Snake River to Ashton, Idaho. Permission has not yet been granted for the use of the water.

BRUNEAU, IDA.—A special election will be held on Jan. 10, 1920, in the Indian Cove irrigation District to issue bonds of the district in the sum of $150,000. Said bonds, if authorized, or the proceeds thereof, shall be used for the purpose of acquiring title to the pumping plant, pipe lines, canals, water rights and irrigation system and for the completion of the said system of irrigation works now partially constructed.

SALT LAKE CITY, UTAH.—The Utah Power & Light Company has made application to the Public Utilities Commission for an increase in its rates for power, the present earnings of the company not being sufficient to pay an adequate return on the investment. No change will be asked in lighting or cooking rates. A continual rise in operating expenses is responsible for the petition, which is the first filed by the company.

SALT LAKE CITY, UTAH.—Prospects of increasing the scope of the famous "White Way" lighting of this city are very bright. A large number of prominent business men whose establishments are in the districts affected have petitioned the City Commission to establish a new district which will include the building of a system similar to the present Main Street lighting on State Street from South Temple Street to Sixth South Street, on Third South Street from West Temple to Fourth East Street, and on Fourth South Street from Main to State; a total addition to the present system of twelve blocks of white way lighting. When the new installation is completed Salt Lake City will be even more famous for its white way lighting, which has already attracted nation-wide attention.



Being frank with the consumer is one of the most recent policies advocated by the public utility, but judging by the following plaint, the consumer does not fully appreciate his privileges:

We are not exactly satisfied
Concerning our gas bill
And we registered a protest.
The man in the gas office
Was very pleasant about it
And said he would attend to the
Matter at once, which he did.
He sent a man up to the house
To read our meter and, meantime,
Telephoned us to go down the cellar
With the man and read the meter
At the same time he read it
So there would be no mistake.
Well, the man got to the house
And we followed instructions
And went downstairs with him
And he pulled out a book
And took note of the meter
And asked us to look at the meter
With all its little dials.
After we had looked at the thing,
He marked down some figures
And said, "Now is everything
All right and O. K.?" And we said:
"Surest thing you know."
We don't know yet how he got the figures
That he marked down in the book,
All of which goes to show
How a man will lie, as we did,
Just to save his pride—also
It goes to show
That you can't skin a gas company.

* * *

Ignorance is not always bliss, and sometimes it can be very expensive:

Last winter an Eastern gas company went into the pipe thawing business. They charged twenty dollars per thaw whether it took the gang two minutes or two hours to complete the job.

One day the gang were out at their work when they were accosted by a yiddish gentleman, who asked what they would charge to thaw a pipe for him. "Twenty dollars," replied the Irish foreman.

That was a lot of money to pay for a few minutes' work, thought the yiddisher, so he started an argument with the foreman, trying to reduce the rate, while the gang climbed a pole preparing to hook up their apparatus.

The foreman would stand for no reduction in the rate, but the customer continued talking and while he was still going the water started flowing.

"See," he said to the foreman, "I don't have to pay you now the water is running."

"Hey, what are you guys doing," yells the foreman at the gang on the pole. "This fellow never paid to have that pipe thawed. Reverse the current and freeze it up again."

"No, don't do that," begged the customer. "I'll pay you the twenty dollars."

* * *

Omar Khayyam found a good many things to be sad about, but his Rubaiyat might have been twice as long if he had lived today. Except for the note of optimism at the end, which Omar would never have permitted, this may stand as the twentieth century's postscript to his famous utterances:

The dollar that we knew long years ago
Full many an earthly blessing did bestow;
That dollar now has dwindled till it seems
A bagatelle, significant of woe.

Eggs have become a rarity with me,
I've hocked my evening clothes to buy some tea,
The phonograph I've longed for all these years
Will never soothe me with its melody.

My winter's wood costs twenty bucks a cord,
Each load makes inroads in my tiny hoard;
Petrol long since has passed beyond my ken
And I use distillate to run my Ford.

There is no succor from the wintry breeze
As I must wear my chilly B. V. D.'s;
I can't afford the long ones which would keep
The circulation active round my knees.

But far away there is a spot of cheer,
The money that we used to spend for beer
Is being saved to cast a giant bell
To sound the knell of every profiteer.

—Richard E. Smith.

* * *

There is a story of a negro mammy who, when asked how she managed to raise her large family of boys to be so well-behaved, replied: "Ah'll tell yo'. Ah raise dem boys wid a barrel stave, an' Ah raise 'em frequent." Here we have the up-to-date barrel stave—the spanking machine—and one of the most recent recruits to the ranks of electrical household appliances. In large families it will doubtless be found a great labor-saver. It seems a pity it was not invented in the days of the much-harassed "Old Woman Who Lived in a Shoe."

Electricity in the home